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ABSTRACT

With the aim of developing a better basis for industrial education curricula as part of career education, 12 cluster plans found in the recent literature are described in the first half of the document. Each description indicates target population, grade level, and the career clusters included, to suggest the plan's comprehensiveness and its focus, and reviews the plan's rationale and methodologies. Evaluation criteria are developed in two categories, internal relationships (those exclusive to any one plan) and external relationships (those concerned with how the plans relate to each other); the 12 plans are analyzed in terms of these criteria. Among generalizations drawn from analysis of the plans are these: most focus on the secondary level; could be implemented in any area, rural or urban; require community involvement; consider individual student needs, societal needs, and manpower needs. Recommendations regarding selection, adaptation, adoption, and further developmental activities include some of general interest to administrators and curriculum planners as well as specific recommendations for adoption of the Comprehensive Career Education Model cluster concept in the State of Michigan. (AJ)

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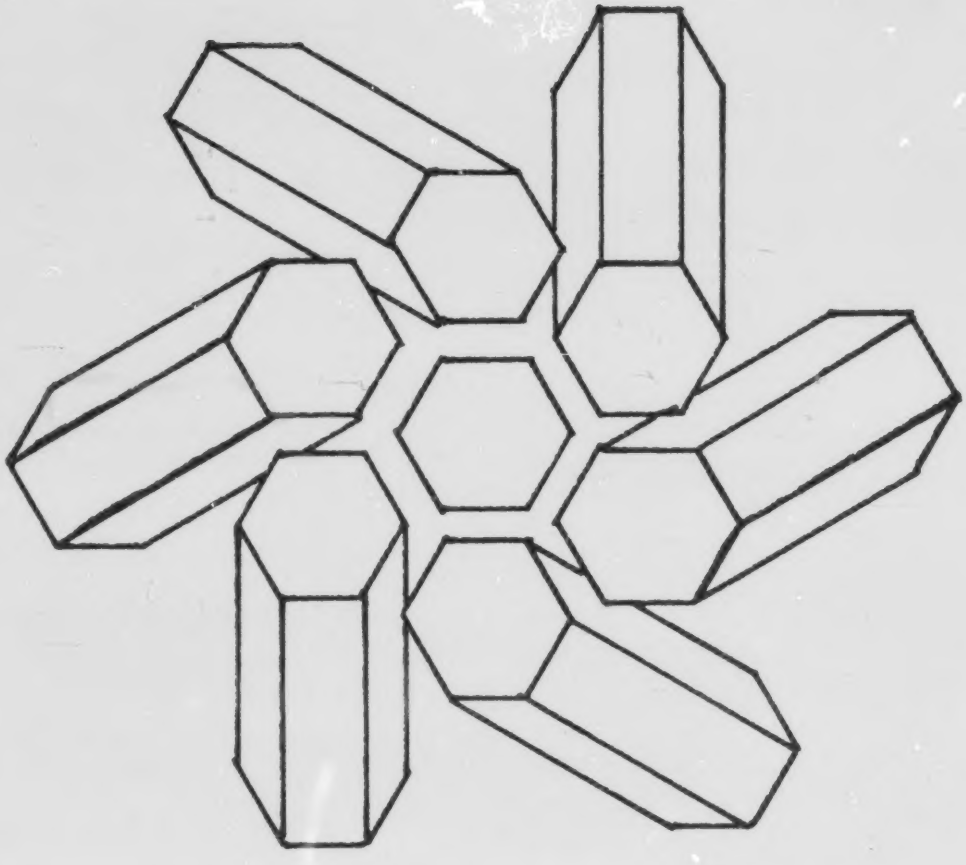
AN ANALYSIS OF
CLUSTER PLANS
FOR SECONDARY SCHOOL INDUSTRIAL EDUCATION AND CAREER EDUCATION

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION



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AN ANALYSIS OF CLUSTER PLANS FOR SECONDARY SCHOOL INDUSTRIAL EDUCATION AND CAREER EDUCATION

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February 1974

PREFACE

This study was motivated by the persistent need to locate the most appropriate cluster plan for industrial education and career education curricula in Michigan schools. Many cluster plans were known to exist, but the comparative appropriateness of their structures and rationales as applied to industrial education and career education was unknown. The specific objectives of this study were to (1) search out cluster plans and their rationales from the literature of recent years, (2) establish criteria for evaluating cluster schemes, (3) evaluate the cluster plans identified, and (4) make recommendations regarding selections, adaptation, adoption, and further developmental activities.

This effort is regarded as the first step in developing a better basis for industrial education curricula as part of career education, particularly in the exploration and preparation phases. Subsequent steps leading toward cluster-based preservice and inservice teacher education options at Michigan State University would include analysis to determine common elements within clusters, formulation of behavioral objectives, design of

instructional delivery systems, and validation of the instructional system.

This research was a project within the Occupational and Applied Arts Education unit of the Department of Secondary Education and Curriculum, College of Education, Michigan State University. It was supported in part with funds from the 1972/73 vocational teacher education project grant made to Michigan State University by the Michigan Department of Education. Full responsibility for this report, including its positive and negative aspects, is accepted by its authors.

While intended ultimately for use in building personal development plans at Michigan State University and elsewhere, this study should be of considerable value to administrative, guidance, and curriculum decision makers in Michigan schools who are involved with career education, particularly at the exploration phase, although clustering has additional utility at the preparation phase when vocational curriculum planners are attempting to avoid excessive specialization.

James Levande
George Ferns

February 1974

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INTRODUCTION

The great proliferation of career education programs during the past five years has presented a multitude of ideas and concepts. With the increased emphasis on career education as a broad base for a total education in preparation for a meaningful and contributory life, the educator is faced with sorting through these ideas and concepts in an effort to provide for the needs of individuals in our ever-changing society and for the career orientations which help it to function. Many of these career education programs use organizational structures that seem similar (if not identical), but really differ in their basic formational rationales. The concept of career clusters is one concept which uses many of the above-mentioned rationales as a base. On the surface, the cluster concept appears to be a simple, logical method for organizing career education curriculums. As Adams stated:

> The practice of grouping occupations is so common and pervasive that the existence of these schemes is hardly noticeable. In this regard consider such areas as industry, government, the military, Civil Service, or fields of work like medicine--each has its own occupational hierarchies and grouping schemes to define status, responsibility, authority, promotion or salary. Within

> education occupations are frequently organized or grouped in some way for instruction in vocational education or in specific subject areas and for guidance, counseling and placement purposes. (1:1)

As can be readily seen, all of the above organizations and institutions cluster in some way in order to meet the goals of what they believe to be a sound and thorough program of career development. In the process of meeting these goals, they have all used rationales that fit particular needs, definitions, and criteria in the development of groupings or clusters of careers.

Curricular decision making involves a process of informed choices. If educators are concerned with providing the best possible programs in meeting the needs of individuals in a changing society, they must be apprised of how and where career education fits into the scheme of a broad-based education, and more specifically, they must be apprised of just where the scheme and rationale for clustering fits into the total concept.

The purpose of this study is to gather together the available information concerning cluster plans for industrial education and for career education, and then to provide some analytical comments concerning use of such plans in the schools and in teacher education. Specifically, the goals of the study can be broken down as follows:

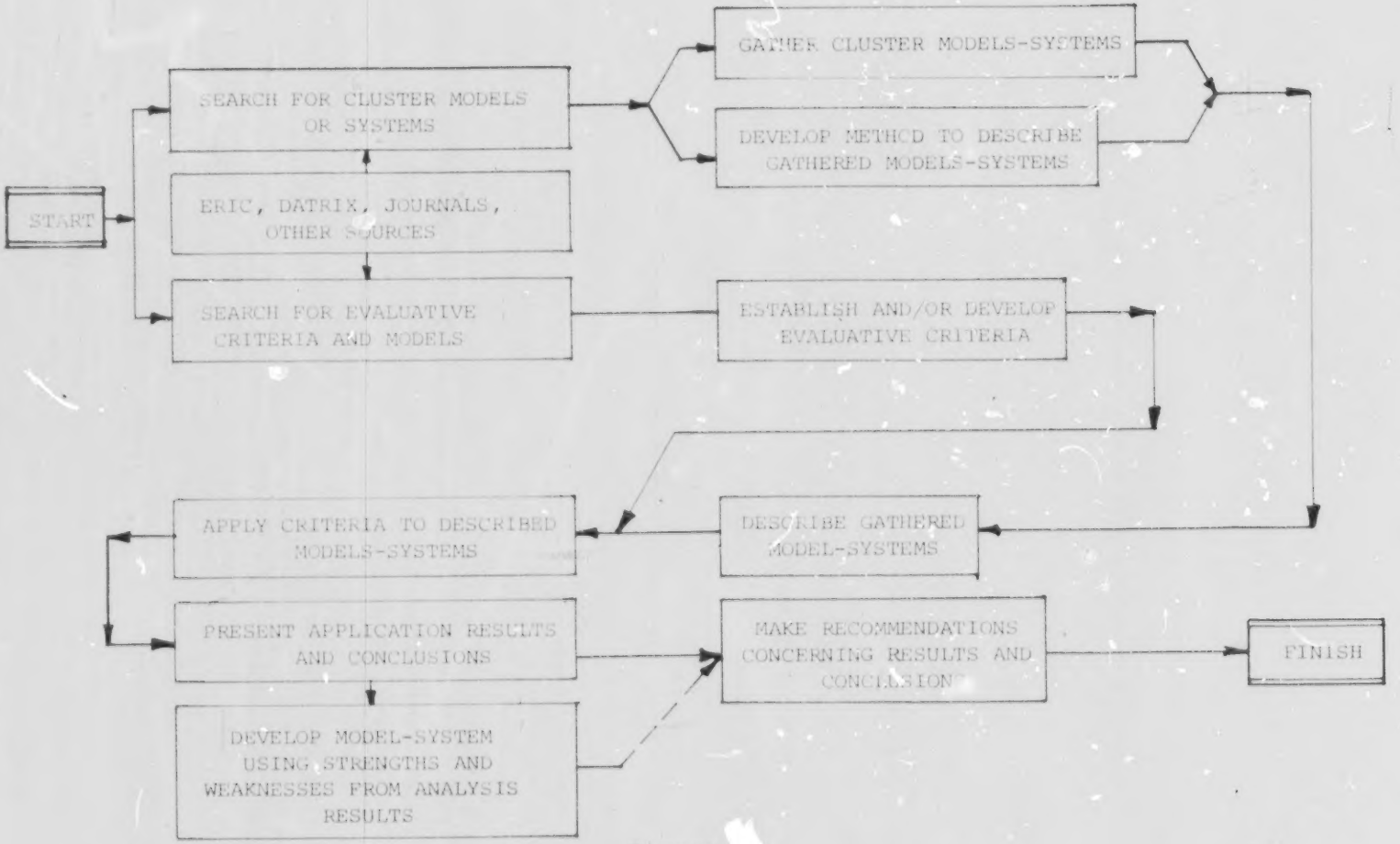
1. Search for and describe the various cluster models, plans, or systems and their rationales.

2. Establish criteria for evaluating the models, plans, or systems with respect to their use in the schools.

3. Evaluate the described models, plans, or systems with respect to their use in the schools, using the established criteria.

4. Make recommendations with respect to the use of the cluster concept in the schools and in teacher education.

The process of meeting these stated goals started with gathering available information concerning clusters from various sources, such as ERIC, DATRIX, journal publications, monographs, working papers, proposals, and consultation with professionals in the area of career education. Simultaneously, the evaluative criteria were developed in preparation for establishing an analytic model for the purpose of making decisions relative to the third stated goal. Once the first two goals were accomplished, the analysis was made and recommendations were proposed on the basis of this analysis. The entire process is described graphically in Figure 1.


START
SEARCH FOR CLUSTER MODELS OR SYSTEMS
ERIC, DATRIX, JOURNALS, OTHER SOURCES
SEARCH FOR EVALUATIVE CRITERIA AND MODELS
GATHER CLUSTER MODELS-SYSTEMS
DEVELOP METHOD TO DESCRIBE GATHERED MODELS-SYSTEMS
ESTABLISH AND/OR DEVELOP EVALUATIVE CRITERIA
DESCRIBE GATHERED MODEL-SYSTEMS
APPLY CRITERIA TO DESCRIBED MODELS-SYSTEMS
PRESENT APPLICATION RESULTS AND CONCLUSIONS
DEVELOP MODEL-SYSTEM USING STRENGTHS AND WEAKNESSES FROM ANALYSIS RESULTS
MAKE RECOMMENDATIONS CONCERNING RESULTS AND CONCLUSION
FINISH

Figure

Process of Cluster Concept Search

DESCRIPTIVE FORMAT

Various methods present themselves to the description of curriculum models, plans, or systems in the field of education. All seem to suggest the use of some framework to describe the educational program. Householder (17:11-12) indicated that classification schemes, while aimed at describing programs, usually end up being formulated on the perceptions of the developer or reviewer. With this idea in mind, one can state, as Cochran did, that, regardless of its direction, the chief function of a curricular framework is to give meaning to a method of identifying, analyzing, and illustrating the basic curriculum elements and their relationships (18:90). All of these factors were considered in developing the format.

Because no curriculum can be dissected, it was recognized at the outset that the above factors of identification, analysis, illustration, elements, and element relationships could not be dealt with as separate items and provide a satisfactory format. As Bicknell (8) pointed out in his use of a systems approach to curriculum evaluation, all parts or components of a system interact with and affect one another in such a way as to

prevent an understanding of the system without looking at the total functioning of the system.

With this essential consideration in mind, the formulation of the descriptive format was based on presenting the factors which would place the models, plans, or systems within the framework of the school, as well as presenting those factors that describe the internal relationships and the organizing rationale of the plans. Inclusion of the above factors was considered to be of primary importance in providing information which explained ideas that give the cluster concept its uniqueness. In addition to the information that was cluster-concept specific, the format included reference to title, source, and developmental and/or administrative personnel.

The following items were selected as those needed to meet the purpose of describing the models, plans, or systems gathered in the study's search efforts:

1. Name or title of the model, plan, or system.
2. Developer of the model, plan, or system.
3. Source of the model, plan, or system.
4. Clusters included in the model, plan, or system.
5. Grade level and target population.
6. Objectives of the model, plan, or system.
7. Description of the plan's rationale.

The first three items in the list provided the information that presented a basic description of the plan. With this knowledge it was felt that, for those who desire it, more in-depth information could be obtained by referring to the original sources.

The listing of the plan's clusters provided identification of the basic areas considered in the plan, the comprehensiveness of the plan, and the focus of the plan in the total world of work and careers.

Presenting the grade levels and target populations helped further to isolate the plan's focus within the scheme of education in general. The statement of objectives or goals provided reference to what would be the outcomes of using or implementing the plan.

The last item listed provided information concerned with giving meaning to the analysis and illustration of the plan's curricular elements and their relationships. Special attention was paid to locating and presenting the philosophical considerations and the underlying assumptions used in structuring the clusters. Noted, too, were methodologies for structuring, development, implementation, evaluation, and instruction.

CLUSTER PLANS

NAME: An Analysis of Fifteen Occupational Clusters Identified by the U.S. Office of Education (31).

DEVELOPER: Grayson County College, Sherman/Denison, Texas, under a grant from the Texas Education Agency.

SOURCE: Same.

PERSONNEL: Dr. Theodore M. Vestal, Neal A. Baker, Jr.

CLUSTERS: AgriBusiness and Natural Resources
Business and Office
Communications and Media
Construction
Consumer and Homemaking Education
Environment
Fine Arts and Humanities
Health
Manufacturing
Marine Science
Marketing and Distribution
Personal Services
Public Services
Recreation and Hospitality (Tourism)
Transportation

GRADE LEVEL: K - 12.

TARGET POPULATION: All students in the schools.

OBJECTIVES: The project's objective was to provide and/or define the content area of each of the clusters.

DESCRIPTION:

The project's purpose was based on the assumption that the USOE clusters were the basic given. The working assumption was that each of the clusters could be associated with all jobs and job families. The Dictionary of Occupational Titles served as the source for the division and coding of all jobs. When a job appeared in more than one cluster, duplication of information was avoided by placing it in one cluster and then cross-referencing it into all other clusters where it would logically fit.

The format followed was to break the cluster into job families and then to divide the job families into specific job titles. The clusters, with their job families, are listed below.

AgriBusiness and Natural Resources

Support and Regulations
Research
Forestry
Land and Water Management
Fisheries and Wildlife
Mining and Quarrying

Petroleum and Related Products
Productive Agriculture
Processing and Marketing
Service

Business and Office

Accounting
Computer
Secretarial Science
Management
Personnel
Finance-Insurance-Real Estate
Office (Clerical)

Communications and Media

Journalism
Motion Pictures
Telephone and Telegraph
Recording Industry
Radio and Television Broadcasting
Satellite and Laser Transmission

Construction

Wood
Metal
Masonry
Electrical
Finishing
Heavy Equipment Operations
Engineering and Support Services

Consumer and Homemaking Education

Food
Housing and Household Equipment
Textile and Clothing
Family Economics and Home Management

Family Relations and Child Development
Extension Service

Environment

Pollution Prevention and Control
Disease Prevention
Environmental Planning
Resource Control

Fine Arts and Humanities

The Visual Arts
Occupations in Writing
The Performing Arts
Architecture
Religion and Theology
Languages and Linguistics
History and Museums

Health

Mental Health and Mental Health Services
Medical and Biological Science Services
Dentistry and Dental Science Services
General Hospital and Medical Office Related Occupations
Medical Emergency Services
Administration of Health Services
Personal and Community Health Services
Pharmaceutical Science and Services
Professional Medical Supportive Personnel
Medical Professions

Manufacturing

Management
Scientists
Engineers
Technicians

- Craftsmen
- Skilled Workers
- Semi-Skilled Workers
- Un-Skilled Workers

Marine Science

- Research
- Mineral and Chemical Extraction
- Off-Shore Drilling
- Fishing
- Aquaculture
- Marine Technology and Engineering
- Surface and On-Shore Support

Marketing and Distribution

- Marketing Management
- Market Research and Analysis
- Purchasing
- Sales Promotion and Training
- Selling
- Physical Distribution
- Related Business Services

Personal Services

- Domestic Services
- Lodging and Related Services
- Barbering, Cosmetology, and Related Services
- Drycleaning, Laundry and Apparel Services
- Stewards, Attendants, and Misc. Personal Services
- Domestic Animal Care
- Food and Beverage Preparation and Service

Public Services

- Administration and Regulatory Services
- Urban Development

Education
Protective Services
Post Office
Public Utilities
Public Health
Labor Affairs
Public Transportation
Social Services, Rehabilitation, Correction
Parks and Recreation

Recreation and Hospitality (Tourism)

Commercial and Non-Commercial Travel Bureaus
Travel Agencies
Transportation
Public, Industrial, and Private Recreation (Commercial and Non-Commercial)
Recreation Concerned with Natural Resources

Transportation

Highway
Rail
Airborne
Pipeline
Water

NAME: Arizona Career Education Plan (4)

DEVELOPER: Arizona State Department of Education

SOURCE: Arizona State Department of Education

PERSONNEL:

CLUSTERS: Business and Office
Marketing and Distribution
Communications and Media
Construction

Manufacturing

Transportation

AgriBusiness and Natural Resources

Marine Science

Environmental Control

Public Services

Health

Hospitality and Recreation

Personal Services

Fine Arts and Humanities

Consumer and Homemaking Related

GRADE LEVEL: K - 12

TARGET POPULATION: All students in the Arizona Schools, regardless of post-high school plans--immediate career, special training, or college.

OBJECTIVES: K - 6

1. To develop positive student attitudes about the personal and social significance of work.
2. To develop each student's occupational awareness and aspirations.
3. To develop each student's self-awareness.
4. To improve overall student performance by unifying and focusing basic subjects around a career development theme.

7 - 8

1. To assist students in evaluating their interests, abilities, and values as they relate to occupational roles.
2. To provide students with additional and detailed exploration of selected occupational clusters leading to tentative selection of a particular cluster for in-depth exploration at the next level.
3. To improve student performance in basic subject areas.

9 - 10

1. To provide in-depth exploration in one occupational cluster leading to entry-level skill in one occupational area and providing a foundation for further progress, leaving open the option to move between clusters.
2. To improve the performance of students in basic subject areas by making them more meaningful and relevant through unifying and focusing around a career development theme.
3. To provide guidance and counseling to assist students in selecting an occupational specialty for 11th and 12th grade levels with the following options: intensive job preparation,

preparation for post-secondary occupational programs, or preparation for a four-year college.

11 - 12

1. To provide every student intensive preparation in a selected cluster, or in a specific occupation, in preparation for job-entry and/or further education.
2. To increase the student's motivation to learn by relating his studies to the world of work.
3. To provide intensive guidance and counseling in preparation for employment and/or further education.
4. To insure placement of all students, upon leaving school, in either (a) a job, (b) a post-secondary occupational educational program, or (c) a four-year college program.
5. To maintain continuous follow-through of all dropouts and graduates and to use the resulting information for program revisions.

DESCRIPTION:

This plan is based on the following definition of career eduation:

Career education combines helping the student (1) learn to live and (2) learn to make a living. It should be available at all levels of education

from first grade through the university. A complete program of career education includes orientation to the world of work, broad exploration of occupational clusters, in-depth exploration [redacted] elected clusters, and career preparation for students. This calls for all basic education subjects to incorporate the concept of career education.

The implementation of this plan has nine guidelines or areas of concentration. They are:

1. Increased enrollment in career preparation.
2. Career testing and counseling.
3. Multi-media library career information media.
4. Teacher and counselor retraining.
5. Orientation to the world of work.
6. New cooperative education programs.
7. Apprenticeship.
8. County workshops.
9. Public information program.

With the exceptions of goals 7 and 9, the responsibility for implementation rests jointly with the state, counties, and local school districts. Apprenticeship and public relations responsibilities remain the function of the state department of education.

The model used to explain the plan is three-dimensional in nature. One dimension of the model is the fifteen occupational clusters; the second is the areas of language arts, mathematics, science, social science, and service; and the third dimension is the grouping of grade levels K - 6, 7 - 8, 9 - 10, and 11 - 12. Figure 2 describes the format graphically.

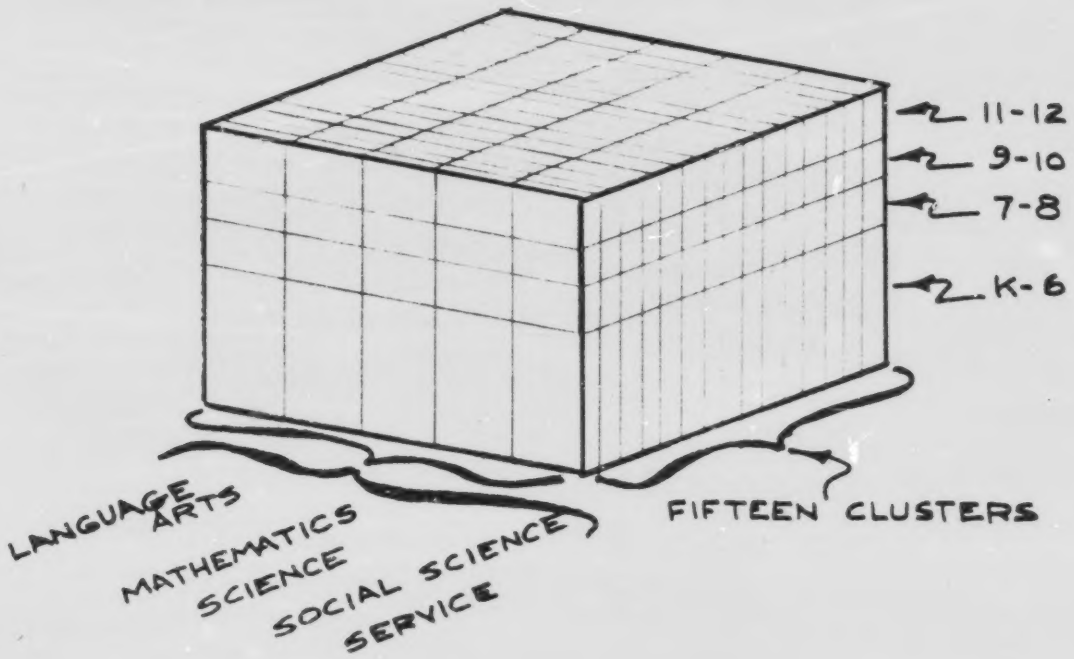


Figure 2

Arizona Career Education Model

Although the plan depicts the five basic skills in one dimension and carries them through grade 12 in all clusters, further division along this same dimension is provided in grades 7 through 12. For example, at grades 7 and 8 the construction cluster is divided into groupings such as design, fabrication-installation, contracting, etc. Continuing this breakdown to grades 9 and 10, another subdivision is made, e.g., contracting divides into office operations, equipment operations, crafts, and materials procurement. At grades 11 and 12 the last division is made: Here crafts is divided into masonry, metal, wood, and glass and plastics. Figure 3 shows this breakdown schematically. The assumption is made that these divisions run parallel to the basic skills divisions in all the clusters.

NAME: Career Development Program (2)

DEVELOPER: Ann Arundel County Public Schools, Annapolis, Maryland 21401

PERSONNEL: Staff Task Force

CLUSTERS: No specific cluster is mentioned in the literature put out by this group. The materials refer to clusters as job families--jobs grouped by some identifiable criteria (e.g., worker traits, skills,

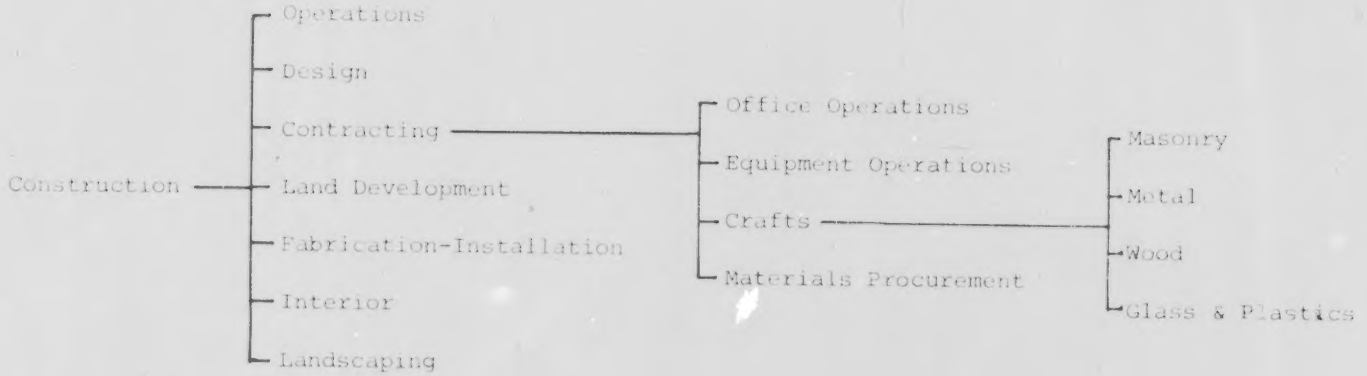


Figure 3

Sample Cluster Breakdown for Arizona Career Education Plan

products, services, etc.). Vocational (occupational) areas are defined as jobs grouped according to general fields (e.g., health, transportation, construction).

TARGET POPULATION: All the students in the county's school system.

OBJECTIVES:

This program presents a set of objectives and a set of strategies that should be used in reaching the desired outcomes. The objectives are:

1. Providing programs which will equip students with an occupational skill for job entry, if they so desire, when they complete their thirteen years of schooling.
2. Preparing students for our changing technological society by developing intellectual skills and the ability to analyze a problem and make decisions so they will be able to adapt to these changes in their lives and in their occupations.
3. Developing in students the proper attitudes and behaviors which will enable them to obtain and hold a job.

The strategies to meet these goals are given as:

1. Having relevant programs at all levels, which are action oriented so that work activities may serve as a vehicle for academic learning.

2. Being flexible and not holding students to rigid requirements that track them into confining programs.
3. Granting the opportunity to enter all subject areas except areas which have a prerequisite of sequential subject development.
4. Offering actual work experience in a cooperative vocational program.
5. Providing the basis for continual learning as well as skills that are transferable among among a variety of jobs.
6. Providing an exploratory vocational experience in a particular occupation or family of occupations.
7. Offering instruction in all disciplines relating to vocational-technical education on a K - 12 basis to permit a continuous progress of learning.
8. Providing guidance K - 12 so that students can identify their abilities and interests and apply this knowledge to their choice of educational and vocational opportunities.
9. Providing means for community involvement.
10. Providing means for continuous evaluation at all levels.

DESCRIPTION:

The rationale used for the development of this program is stated as:

> . . . a sequential interdisciplinary program based upon skills, attitudes, behavior, and experiences deemed necessary for vocational decision-making.

The design of the program is organized around a conceptual framework encompassing five major areas identified as having concepts for career education; they are career, self, society, technology and economics. For these designated areas, broad conceptual statements channeling student's learning are written. Then many supporting ideas contributing to the comprehension of the major concepts are stated as subconcepts. Since the scope of the program calls for an integration of the learning of all conceptual areas, all concepts are parallel and will be taught simultaneously.

To measure and evaluate learning outcomes there are behavioral objectives for each sub-concept. Since these objectives have been aimed at the student's level of comprehension and developmental stage of learning ability, the program is divided into four levels of learning. There are behavioral objectives for each of these levels with interdisciplinary activities suggested to accomplish the stated outcomes. In determining what should be learned in each of these levels, the development of student's cognitive, affective and psychomotor domains was considered.

Based on the above rationale, the developers gave this explanation for the program they proposed:

> Career Development education is inseparable from education in general, since ultimately education leads to a vocational objective. Therefore, it is the responsibility of the school to develop a positive attitude in all students toward work and to foster the idea that all work is honorable. To reflect this belief, all areas of the curriculum should incorporate career education into their programs for the purpose of building the relevance of school and facilitating the complex task of career choice.

This concept should be developed in the elementary years by instituting attitudes toward and an introduction to the world of work; in the middle years by developing attitudes and behaviors for work in a deeper vocational exploration; and in the final years by providing an opportunity for a specific vocational skill development.

In order to demonstrate this relevancy, students should begin to explore their own abilities and interests so that eventually their occupational choice can be based on a meshing of self-knowledge, educational experience, and vocational information.

For the purpose of insuring that each individual has the maximum opportunity to select a career freely and to recognize that this choice will be based on knowledge of self, environment, educational training and opportunities, the school should provide continuous guidance beginning at an early level so that the student will be able to identify talents and set realistic and knowledgeable goals.

All the activities in the program are referenced according to the specific subject-matter area into which they might best fit. The specific subjects listed are:

Social Studies	Physical Education
Language Arts	Home Economics
Mathematics	Industrial Arts
Science	Distributive Education
Music	Business Education
Art	

NAME: Comprehensive Career Education Model (School Based), CCEM (25)

DEVELOPER: Center for Vocational and Technical Education (CVTE), The Ohio State University

SOURCE: The Ohio State University

PERSONNEL: Staff CVTE

CLUSTERS: Natural Resources
Manufacturing
Construction
Trade and Finance
Transportation and Communication
Government
Education
Health and Welfare
Personal Services
Product Services
Arts and Humanities
Recreation and Entertainment

GRADE LEVEL: K - 12

TARGET POPULATION: All students in the educational system that employs the model.

OBJECTIVES:

The major goal of the CCEM is to focus the educational program on the accumulation of knowledge, skills, and attitudes through career studies. Pine (25) gave the program's goals as:

1. Restructure the entire educational program around real life.
2. Integrate academic knowledge and skills with occupational training.
3. Assure that each exiting student will be prepared for further career education or for entry into an occupation.
4. Provide for each student a program relevant to his becoming a self-fulfilled, productive, and contributing citizen.
5. Incorporate into the program community resources and nonschool educational opportunities.

DESCRIPTION:

The proposal of this model is seen as a means of integrating available career information systems and maintaining an optimum interface among these systems. The United States Office of Education's (USOE) fifteen clusters, The Human Resources Research Organization model (HumRRO), the Standard Industrial Classification, and the Dictionary of Occupational Titles (DOT) Volumes I and II were the systems considered in the development of this model. For the most part, the USOE, Standard Industrial Classification, and the DOT provided listings, indexing and coding, and grouping of

job names, occupational traits, and basic job descriptions. The HumRRO model provided the clustering system criteria.

HumRRO used these criteria for their examination of the existing clustering systems:

1. The system must encompass most existing jobs.
2. The system must translate itself into an entire K - 12 curriculum.
3. The system must show clear advantages over other systems.

No system examined met all of the criteria.

The clustering system used in the CCEM was devised incorporating the useful features of the other clustering systems. This new system, the CCEM cluster model, stressed two critical dimensions:

1. Functions and contents of occupations.
2. Status or levels of occupations.

In planning for instruction based on the model, three functions were considered:

1. Inform students about the world of work.
2. Assist students in choosing a suitable career.
3. Provide models to shape instructional objectives and learning experiences.

With the above dimensions and functions in mind, the developers examined theories in the

areas of vocational guidance, curriculum development, and human growth and development. This examination provided a group of elements of career education. In the process of identifying and defining these elements, the key standard was that the elements should provide for the self-actualization of the student. The elements are:

1. Career Awareness
2. Self-Awareness
3. Appreciations-Attitudes
4. Decision-Making Skills
5. Economic Awareness
6. Beginning Competency
7. Employability Skills
8. Educational Awareness

The elements are to be developed through the twelve grades and result in terminal behaviors or outcomes.

Figure 4 describes how the elements relate to the terminal characteristics and to each other. The developers point out that there is a horizontal as well as a vertical consistency to be maintained in the use of the model.

A three-dimensional matrix is used to describe the body of career information. The DOT, Volume I, was the foundation for the model's matrix; it

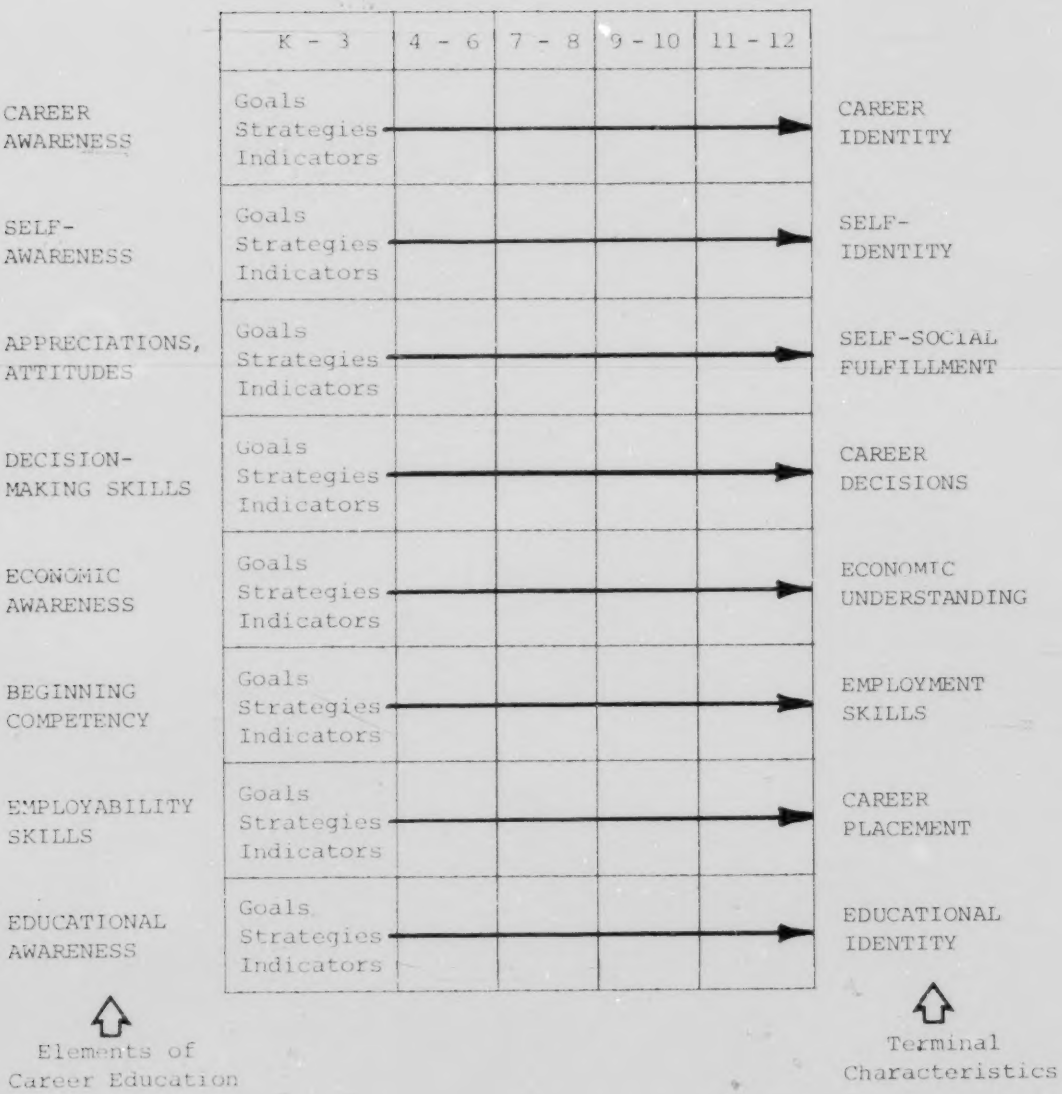


Figure 4

Relationship of CCEM Career Elements to Terminal Characteristics

provided the occupational definitions. Upon this base of occupational definitions, the model erects a three-axis grid of product, process, and person. The product is what is made, the process is how the product is made, and the person is who does the work. The basic model is depicted in Figure 5.

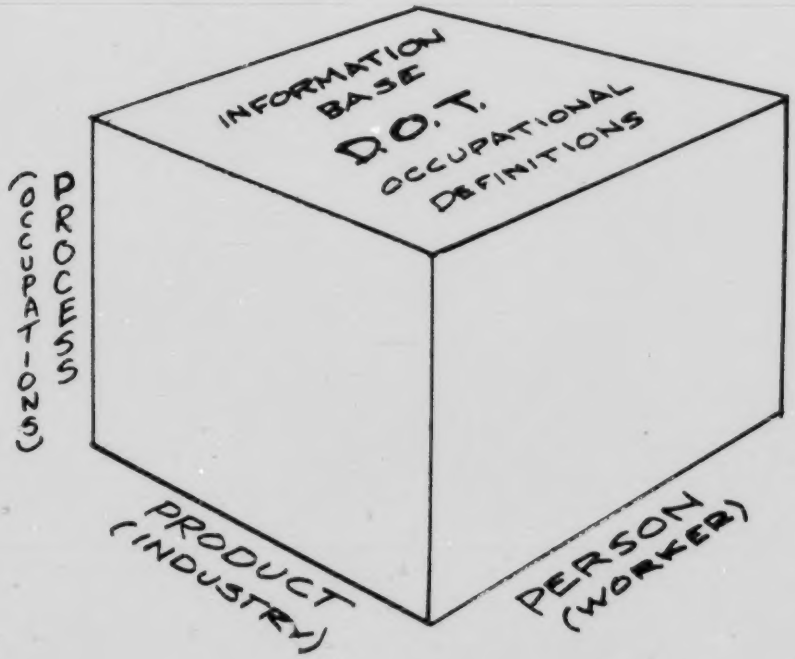


Figure 5

Basic Model--The Career Information Model

The matrix has levels of specificity that correspond to the various grade levels from K through 12.

Along the product information axis, three levels are specified with an option for a fourth level of specificity at grades 10 - 12. The following diagram illustrates the breakdown for the various grade levels.

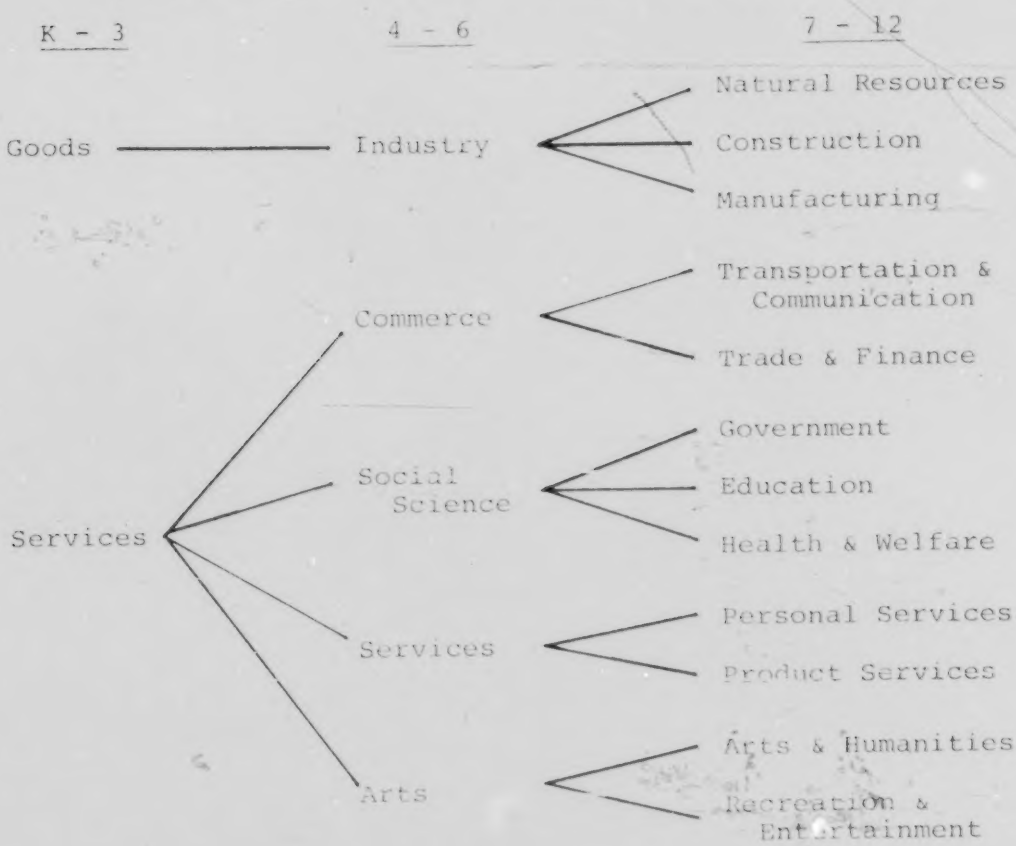


Figure 6

Relationship of CCEM Clusters

The undiagramed, optional fourth level of specificity for grades 10 - 12 uses the DOT-229 industries for further definition, especially natural resources and manufacturing. All three levels indicate a clustering, with the third

providing a cluster system similar to the USOE's groupings.

The process-information-occupations axis involves organizing by tasks performed. At the K - 3 level, this is based on common or related tasks such as managers, leaders, and policy makers; technicians and craftsmen; and general workers and employees. In the 4 - 6, 7 - 9, and 10 - 12 levels, this axis is broken down along the lines of the first three digits in the DOT code number. At the 4 - 6 level, nine categories are provided (first digit of the code number). In grades 7 - 9, 83 occupational divisions are included (first and second digits of the code number). At 10 - 12, the 7 - 9 division can continue. All three digits in the code can be used to provide up to a maximum of 603 groups or levels.

The third and final axis in the matrix deals with work traits, aptitudes, and vocational interests. No specific breakdown for the K - 3 level is provided. At 4 - 5, this third dimension takes on the characteristics provided in the last three digits of the DOT code number, which relates to working with Data, People, and Things at various job function levels.

The hierarchies of functions are as follows:

(30)

DATA (4th digit)	PEOPLE (5th digit)	THINGS (6th digit)
0 Synthesizing	0 Monitoring	0 Setting-up
1 Coordinating	1 Negotiating	1 Precision Working
2 Analyzing	2 Instructing	2 Operating-Controlling
3 Compiling	3 Supervising	3 Driving-Operating
4 Computing	4 Diverting	4 Manipulating
5 Copying	5 Persuading	5 Tending
6 Comparing	6 Speaking-Signaling	6 Feeding-Offbearing
7 No significant relationship	7 Serving	7 Handling
8 No significant relationship	8 No significant relationship	8 No significant relationship

At 7 - 9, the DOT Worker Trait Groups provide the breakdown. The Qualifications Profile for these trait groups includes estimates or measures of General Education Development, Specific Vocational Preparation, Aptitude, Interest, Temperament, and Physical Demands. Along with other descriptions of work performed, worker requirements, training, and methods of entry and other points, these trait groups are used in matching job applicants to jobs. At the 10 - 12 level, the Worker Trait Arrangement provides a very specific description for particular

jobs that the student can match to his developed abilities and personal knowledge about himself.

The total model is depicted in Figure 7. The matrices in Figure 7 show the levels of specificity for the 7 - 9 levels.

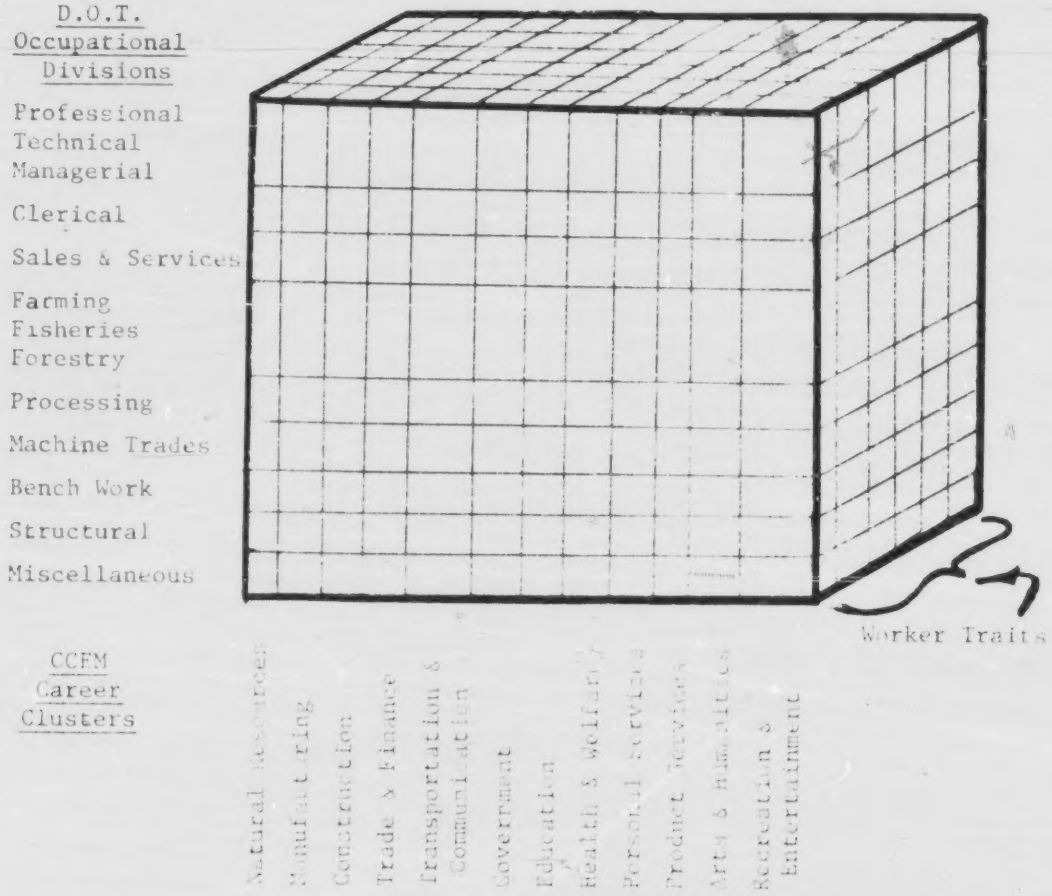


Figure 7

CCEM Career Information Model

The knowledge model described above is incorporated into the instructional system by emphasizing career awareness at K - 6, career exploration at 7 - 9, and career preparation at 10 - 12. Activities are proposed so that the process-occupation axis interfaces with preparation and placement, exploration with person-worker, and awareness with product-industry. Figure 8 diagrams this interface.

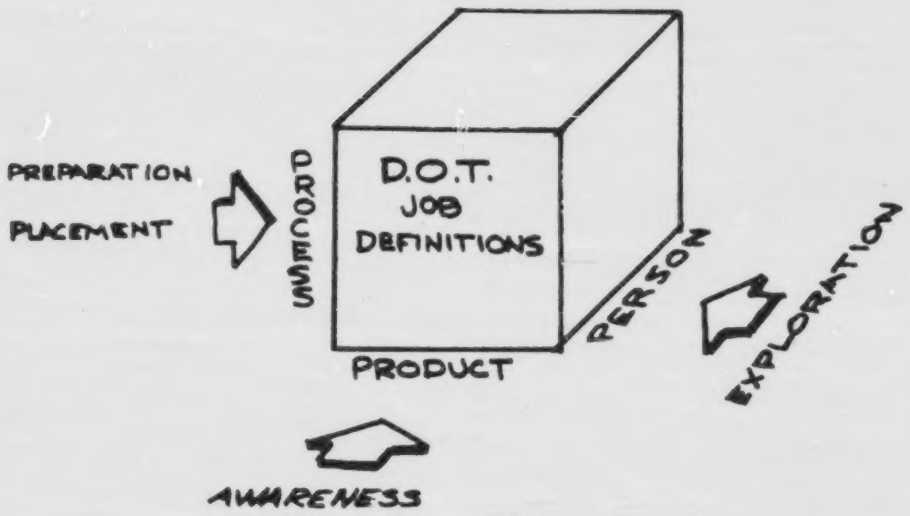


Figure 8

Interface Instructional Emphasis with CCEM Career Model

NAME: ISCO--(CIRF)--International Standard Classification of Occupations (19, 20)

DEVELOPER: International Labor Office (ILO)

SOURCE: ILO

PERSONNEL: ILO

CLUSTERS: Professional, technical, and related workers

Administrative and managerial

Clerical and related

Sales

Service

Agriculture, animal husbandry and forestry workers, fishermen, and hunters

Production and related workers, transport equipment operators, and laborers

Workers not classified by occupation

Armed Forces

DESCRIPTION:

The ILO does not offer an educational base for the organization of its clusters, but builds upon the International Stnadard Classification of all Economic Activities. This classification of economic activities contains ten categories:

1. Agriculture, hunting, forestry, and fishing
2. Mining and quarrying
3. Manufacturing
4. Electricity, gas, and water
5. Construction

6. Wholesale and retail trade, and restaurants and hotels
7. Transport, storage, and communication
8. Financing, insurance, rel estate, and business services
9. Community, social, and personal services
10. Activities not adequately defined.

Another publication of the ILO (20) offers a breakdown of activities on the production-service division. (Additional information on the sub-levels of these activities can be found in this publication.)

Production:

1. Manufacturing
2. Processing
3. Extractive
4. Building
5. Civil engineering and public works
6. Agriculture

Service:

1. Transport
2. Power generation and other public utilities
3. Repair, maintenance, cleaning, and other similar services
4. Distribution--wholesale and large-scale retail
5. Catering
6. Entertainment and information

This production-service division is focused on the enterprise approach to providing for society's needs.

NAME: The Cluster Concept Program

DEVELOPER: The University of Maryland, Industrial Education Department

SOURCE: ERIC

PERSONNEL: Dr. Donald Maley, Mr. Nevin Frantz, Dr. Walter S. Mietus

CLUSTERS: Construction
Electro-Mechanical Installation and Repair
Metal Forming and Fabrication

GRADE LEVEL: 11 and 12

TARGET POPULATION: Students who are not college bound, who want to explore career-oriented areas, but who also want to remain in the mainstream of the school's program.

OBJECTIVES:

General Objectives

1. To provide students with the opportunity for a greater degree of mobility on a geographical basis.
2. To provide students with the opportunity for greater mobility within an industry or occupation.

3. To provide students with the opportunity for greater flexibility in occupational choice patterns.
4. To develop students who will be able to adapt to technological changes.

Specific Objectives

1. To broaden the students' knowledge of available opportunities in occupations found in each cluster.
2. To develop job entry skills and knowledge for several occupations found in a cluster.
3. To develop safe habits and a favorable attitude toward work required in the occupations in a cluster.
4. To develop a student's insight into sources of information that will be helpful to him in his move through the occupational areas.

DESCRIPTION:

This program was based on the question, "What kind of an education should an individual have who does not go on to college or to other forms of higher education and who has not definitely decided on an occupation appropriate to conventional vocational preparation?" The developers answered the question with the cluster concept for the following reasons: (1) Workers in our

society require geographical mobility. (2) To adapt to intra-industrial change in this era of rapid technological development, a worker must have versatility within the industry. (3) A broad training background provides insurance against occupational obsolescence. (4) Few high school students know what their occupation will be; these students need a program that will enable them to keep open a greater number of career options.

The aim was to give students a range of skills that would prepare them for entry-level capability in a variety of related rather than specific occupations. Potential employability would be enhanced by providing a wide range of entrance skills and a level of articulation across several occupational areas. The training from the clusters would enable the student to move laterally through several occupational categories, as well as vertically within an occupation.

The concept for this approach was based on the thinking of Dr. Maley and the experiences he had had in industry and education. The main points of his philosophy can be stated as: (1) Educators should refuse to accept the idea that high school students are ready to choose a specific occupational goal; (2) courses should

be designed to fulfill people's desires; (3) courses should be designed to maximize a person's capabilities. These points formed the initial rationale for the program's development.

Each cluster is divided into occupations or occupational areas. The occupations are broken down into tasks, which are coded into Level I or Level II. Tasks needed immediately on entering a job are at Level I; at Level II are tasks that will be needed soon after entering an occupation.

All tasks are further subdivided into elements of human requirements. The guideline for this breakdown is: (1) Communication, (2) Measurement, (3) Skills, (4) Math and Science, and (5) Information. These elements of the human requirements provide a basis of commonality among the occupations in a cluster and across clusters. The degree of commonality is also provided for each of the elements. In some cases, the element is occupation-specific, e.g., exploring the electron theory of current flow in welding. Others are cluster-specific, e.g., laying out stock with a surface gauge, while others fit into all clusters, e.g., reading blueprints to determine size and characteristics of the work piece.

The materials for each cluster are set up in separate courses. The course materials provide:

a. Task lists at both Levels I and II.

b. Human requirements written in behavioral terms and grouped under the five human requirement elements.

c. Suggested instructional sequences to be used by the teacher in developing lessons for the tasks in each occupation.

d. Lists of skills and knowledge common to specific occupations in each cluster, as well as lists of those skills common to more than one occupation in the cluster.

The rationale also includes the assumption that teachers in these clusters will be able to have a broader view of the cluster than would be expected of a teacher in a very specific vocational-technical course. For example, in the construction cluster, knowledge and skill in five occupational areas--carpentry, electricity, masonry, painting, and plumbing--would be necessary. It is also assumed that physical facilities could be altered or provided to meet the different demands of teaching the clusters.

NAME: Conceptual Base for Industrial Education (CBIE) Project (6)

DEVELOPER: Wichita State University, Kansas, and the Wichita, Kansas, Public Schools

SOURCE: Same

PERSONNEL: Howard Runft, Wichita State University
Smiley Ebert, Director of Industrial Arts, Wichita Public Schools

CLUSTERS: Construction
Manufacturing
Visual Communication
Materials and Processes
Power and Energy

GRADE LEVEL: 7 - 12

TARGET POPULATION: Students with post-high school employment or education as their goal.

OBJECTIVES:

For grades 7 and 8, the objectives are essentially those of the Industrial Arts Curriculum Project (IACP) programs in the construction and manufacturing clusters. The visual communication, materials and processes, and power and energy clusters for the high school program are aimed at building upon the 7th and 8th grade objectives and expanding from this base. An introduction-analysis-synthesis format is followed in the

progress of a student as he proceeds through these clusters.

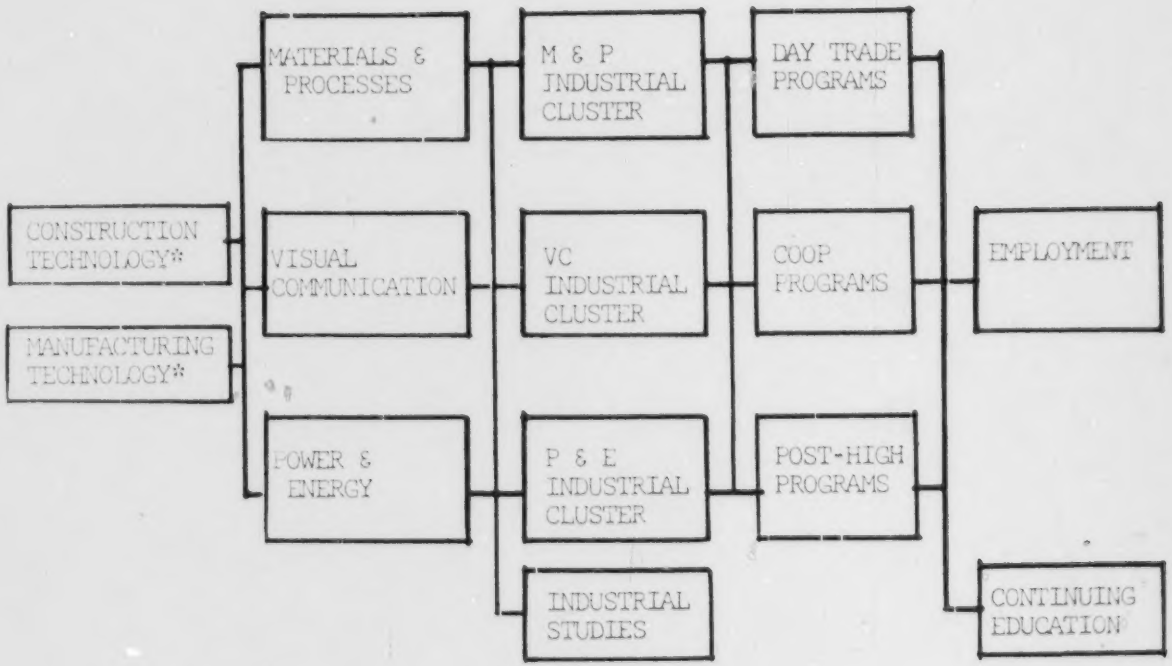
DESCRIPTION:

This plan is a model for the implementation of the State of Kansas' Plan for Industrial Education. The schematic in Figure 9 describes the structure of the plan.

The construction and manufacturing clusters for grades 7 and 8 follow the rationale and outline used in the IACP materials. The plan's developers quoted Lawrence Foth (Specialist, Industrial Education, Kansas State Department of Education) in describing their rationale:

> Traditional programs have shown little interest in the total impact of technology on our society, having placed emphasis on a narrow portion of the total complex, namely production. [The] . . . total perspective of industry, including financial, sociological, and productive elements can be readily identified as the base for the CBIE program.
>
> The 'wholeness of industry' concept for industrial arts took roots in the early 1960's and is distinguishable in a great many theoretical proposals for curriculum development. . . . The Industrial Arts Curriculum Project at Ohio State University is one approach that has realized rather enthusiastic acceptance at the junior high school level but has subsequently made evident a critical vacuum at the secondary level. CBIE has taken a giant step toward filling that void. . . .

The "void" is filled with three clusters: Visual Communications, Materials and Processes, and Power and Energy; these are presented as three



*IACP or equivalent "wholeness of industry."

Figure 9

Structure of the State of Kansas' Plan for Industrial Education

one-hour, full-year classes. Consideration is given to the addition of courses in each cluster at some point in the future. The course outlines are as follows:

Materials and Processes

Introduction	Unit I	Industrial Production
	Unit II	Structure of Matter (Metals and Non-Metals)
Analysis	Unit III	Separating Processes
	Unit IV	Forming Processes
	Unit V	Combining and Fabrication
	Unit VI	Finishing Processes
Synthesis	Unit VII	The Development of Products

Visual Communications

Introduction	Unit I	Orientation of Design
Analysis	Unit II	Printed Geographic Communication
	Unit III	Photographic Communication
	Unit IV	Technical Graphic Communication
	Unit V	Communication Transmission Systems
Synthesis	Unit VI	Systems Approach to Visual Communication Industry
	Unit VII	Summary and Review

Power and Energy

Introduction	Unit I	Introduction to Power and Energy
Analysis	Unit II	Mechanical Systems
	Unit III	Fluid Power Systems
	Unit IV	Electrical Systems
Synthesis	Unit V	Electrical-Fluid-Mechanical

A fourth area of instruction, Productive Enterprise, is also included in the plan; it crosses over the three clusters at the upper end of the plan. Productive Enterprise is conceptualized as a program that contemplates the problems of living in an industrial society.

Eight general content headings are stated for this course:

1. Leisure Time
2. Communications
3. Organizational Patterns
4. Industry
5. Social Economics
6. Job Requirements
7. Security
8. Technology and Natural Life

No specific Intro-Analysis-Synthesis format is presented for this area. The aim is for each topic to identify problems and propose solutions.

NAME: Galaxy Plan (29)

DEVELOPER: Detroit, Michigan, Public Schools

SOURCE: Detroit Public Schools

PERSONNEL: Director and Staff, Department of Vocational Education, Detroit Public Schools

CLUSTERS: Materials and Processes
Visual Communications
Energy and Propulsion
Personal Services
Business Education*
Electronics*

GRADE LEVEL: 7 - 12

TARGET POPULATION: Students who intend to enter college, apprenticeships, or employment after high school.

OBJECTIVES:

Cochran (10:60) stated that the plan has the following objectives:

1. To provide each student with a more efficient opportunity to learn about the world of work.
2. To provide each student with a better opportunity through actual laboratory experiences to choose the career he would like to follow.
3. To provide every student (including full-time college-bound and general students) with a manipulative skill that would be of immediate value to an employer.

*Added after the original concept was developed.

DESCRIPTION:

The basis for the organization of the clusters in the plan was the desire to organize 40,000-plus identified job skills into manageable groups that are similar in knowledge, manipulative, and attitude skills. The clusters form one part of a three-part approach to a total educational program. The parts are:

1. Basic Education--which includes such areas as math, social studies, and science.
2. Personal Development--which includes psychology, health, and creative and cultural arts.
3. Career Preparation--which is based on a sequenced search for a career with provision for skill development.

The plan concentrates on the third part of the educational program: it is aimed at exploring career clusters, selecting a family of occupations, and engaging in in-depth experiences for a specific occupation.

Three phases are used in the plan. Phase I is exploratory in nature and uses a project-centered format while rotating 7th and 8th grade students through the clusters. Phase II involves in-depth exploration of the clusters through intensive units, using the exercise method to

develop manipulation skills and knowledge of work tolerance. Phase III requires the selection of a specific cluster for concentration at grades 11 and 12. Guidance from the school counselor and the home is used in helping the student in this final selection of a cluster to study.

To provide for various individual student differences, four "paths" are followed through each of the phases. The paths are determined by the student's demonstrated abilities, achievements, aptitude, motivation, and career goals; guidance techniques are used whenever possible in helping the student determine which path to follow. The paths are:

1. Science and Engineering
2. Technician
3. Trade
4. Occupational

Path one usually involves one period of instruction per day, while path two requires two periods and path three, three periods. Path four varies from four to eight periods a day, and here the instructional program takes on the full responsibility for the basic and personal development aspects of the total educational program. In the other paths, these responsibilities are shared with the other areas of the school's program.

NAME: Industrial Arts Curriculum Project (IACP) (23, 24, 28)

DEVELOPER: The Ohio State University and the University of Illinois

SOURCE: The Ohio State University and McKnight Publishing Company

PERSONNEL: D. J. Lux, W. E. Ray, J. Stern, and E. R. Towers

CLUSTERS: Construction
Manufacturing

GRADE LEVEL: 7 - 8 - 9

TARGET POPULATION: All students in the public schools.

OBJECTIVES:

Cochran (10:78) gave the following objectives:

1. To create understanding of the concepts, principles, generalizations, problems, and strategies of industrial technology.
2. To develop an interest in and appreciation for industry as an integral part of the economic system that provides material goods for the satisfaction of human wants.
3. To demonstrate knowledge and skills that will be useful in life situations of occupational, recreational, consumer, and socio-cultural importance.

DESCRIPTION:

The rationale for the organization of this program is based on the following assumptions:

1. Industrial arts is a study of industry. It is an essential part of the education of all students, in order that they may better understand their industrial environment and make wise decisions affecting their occupational goals.
2. Man has been and remains curious about industry, its materials, processes, organization, research, and services.
3. Industry is so vast a societal institution that it is necessary, for instructional purposes, to place an emphasis on conceptualizing a fundamental structure of the field, i.e., a system of basic principles, concepts, and unifying themes.
4. For purposes of analysis, man's knowledge can be categorized and ordered logically.
5. To provide for the most effective and efficient transmission of knowledge, the educator should codify and structure disciplined bodies of knowledge.
6. The structure of a body of knowledge can be developed before the total curriculum is designed.

7. All domains of man's knowledge must be included in an effective general education program.

The first three of these assumptions were formulated at the onset of the program's development; the remaining four were made while the initial study was in progress.

The latter four assumptions became the basis for a search to determine if there was an identifiable body of industrial knowledge. Four criteria were used for the identification of a knowledge structure:

1. Definable context, i.e., having boundaries or limits
2. A meaningful order of elements
3. The sum of the elements equalling the context
4. Discernible relationships among elements.

In the application of these criteria, the developers selected a four-class or domain structure of knowledge (E. Maccie, 1965). The four classes of knowledge in this structure are:

1. Formal knowledge
2. Prescriptive knowledge
3. Descriptive knowledge
4. Praxiological knowledge

Praxiological knowledge is that domain or class which is associated with industry.

The "praxis" concept is set into the context of societal institutions: family, religion, politics, education, and economics. The economic institution is the focus of the project's identification of practices and the knowledge of practice; the breakdown of this institution is shown in Figure 10.

Service, as a distinct entity, is not present in this model. Service is viewed as an integral part of all economic activities, and it is in this fashion that the concept is used through the IACP model. A further rationale for this position is provided, in that the practical or industrial knowledge that is necessary to provide "service" is a product and outgrowth of the manufacturing and construction process. The term post-processing is used to indicate where "service" is integrated into the model.

The focus on the economic activity industry is depicted as being part of a material production continuum. The continuum is depicted in Figure 11.

One example is given to describe the workings of the continuum: agricultural (genetic) production going directly to the consumer or being processed and fossil fuels (extractive) going direct or being converted into electrical energy.

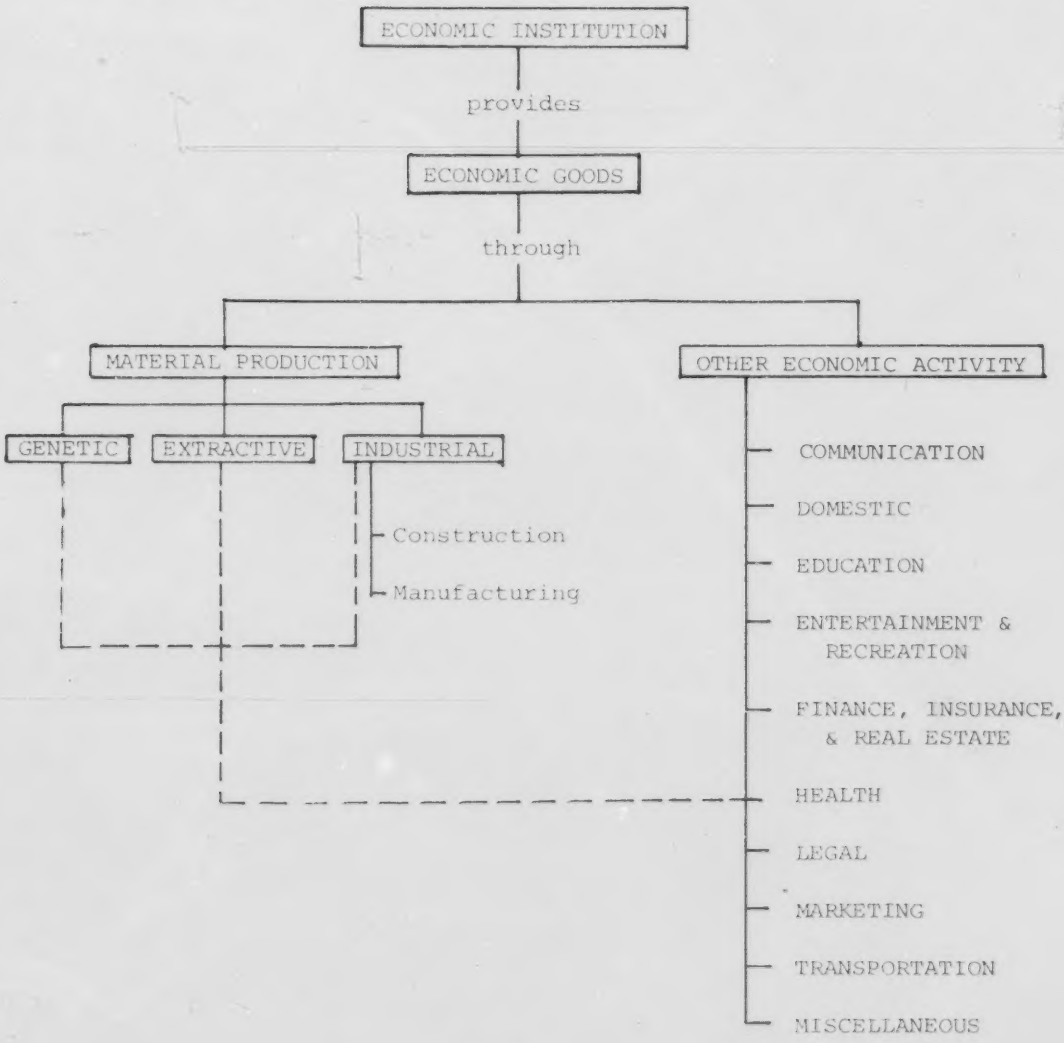


Figure 10

IACP Breakdown of the Economic Institution

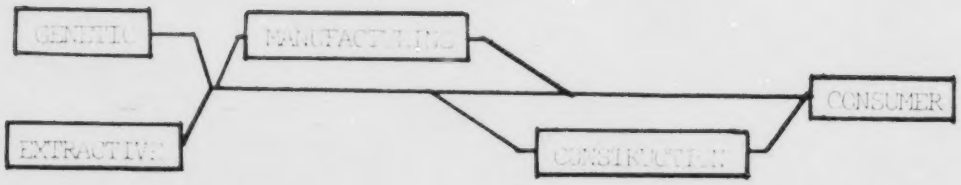


Figure 11

Material Production Continuum

The total body of knowledge contained in industrial technology is presented in a three-dimensional matrix using increasing levels of specificity along one or more of the axes. The basic, or first-order, matrix has three general categories, one for each axis; the categories are:

1. Industrial Material Goods
2. Industrial Production Practices
3. Industrial Management Practices Affecting Humans and Materials

Further orders of specificity are contained in the three categories above. A breakdown of the major axes and the interchangeability of the various levels provides for structures within the matrix to exist parallel to each other. An example of this is the co-existence at the same level of technology affecting humans with technology affecting materials.

Separate structures may exist parallel to each other at any one level of specificity. An example

of this is the second-level breakdown of technology affecting humans, which co-exists with the technology affecting materials.

Industrial Practices (y) and Industrial Management Practices (z) change, while Industrial Material Goods (x) remains the same.

The breakdown, in terms of specificity levels, can continue to a finer and finer point in the model. Because of the infinite possibilities for breakdown, the project directed its efforts at the junior-high level. It is noted that consideration should be given to the potential application of the model at all grade and sophistication levels.

The two clusters, construction and manufacturing, use the breakdown of specificity levels in the organization of knowledge for the instructional programs that are the outgrowth of the model. The construction cluster is taught as the first course, with manufacturing following. The instructional materials and methodology are organized around activities that reflect the various practices affecting humans and materials in production and management. The course of study continuity follows an introduction-orientation, analysis, synthesis format in the presentation of the instructional material to the student.

NAME: The "Orchestrated Systems" Approach to Industrial Education (32)

DEVELOPER: L. W. Yoho, School of Technology, Indiana State University, Terre Haute, Indiana

PERSONNEL: L. W. Yoho

CLUSTERS: Construction
Extractive Industries
Consumer Goods
Manufacture
Services
Salvage
Distributive-Transportation-Marketing
Business and Financial
Governmental
Personal Services
Living and Homemaking

GRADE LEVEL: None indicated.

TARGET POPULATION: None indicated.

OBJECTIVES:

Cochran (10:53) stated that four main objectives have been identified for this program. He listed them as:

1. To provide for a synethesized understanding of the broad spectrum of industry.
2. To understand how society produces the goods and services important for building a good life for individual members of society.

3. To sample adequate industrial experience so that individuals can test and measure their potential talents and interests relating to production of goods.
4. To provide product-producing experiences along with supportive skills and technical knowledge so that the existing relationships between the parts and whole industry are understood.

DESCRIPTION:

This program is based on a global approach to the development of an industrial arts curriculum. This approach places education within the context of society, then goes on to analyze the interrelationships in the production and consumption of goods and services. The analysis takes the form of a model called Systems Network Analysis Process (SNAP) to describe the roles of the various subsystems in the total society. The graphic displays of this analysis are called SNAP maps; they portray the various interrelationships of all the elements of not only education but society in general. These maps form a hierarchical structure for the analysis, and provide four levels of operation. The first level of the model places education within the context of society; the goal of the system is described as "good life in society with

dignity, creative responsibility and capacity for responsible freedom and independent action" (32:5). Each of the components of the Level I system is broken down at the second level, and it is at this level that the clusters are introduced. The cluster concept comprises that part of the system called "Education for Competencies in Production and Consumption of Goods and Services." No rationale is provided for the division of this area into occupational clusters, but the development of the model at Levels III and IV indicates the content and organization of the program. The SNAP maps presented below give an indication of how the plan is organized.

The instructional strategy for the use of the model groups itself around the central core of activities associaited with the planning and production of a product; this is referred to as the "game-in-play" area. Around this core is a series of learning and practice of skills activities; these activities are called the "bull pen." In this "bull pen" area are: product design, research and development; manufacturing processes and training; plant layout and materials handling; jig and fixture design and production; gauge and tool making, tool-up and training; communication,

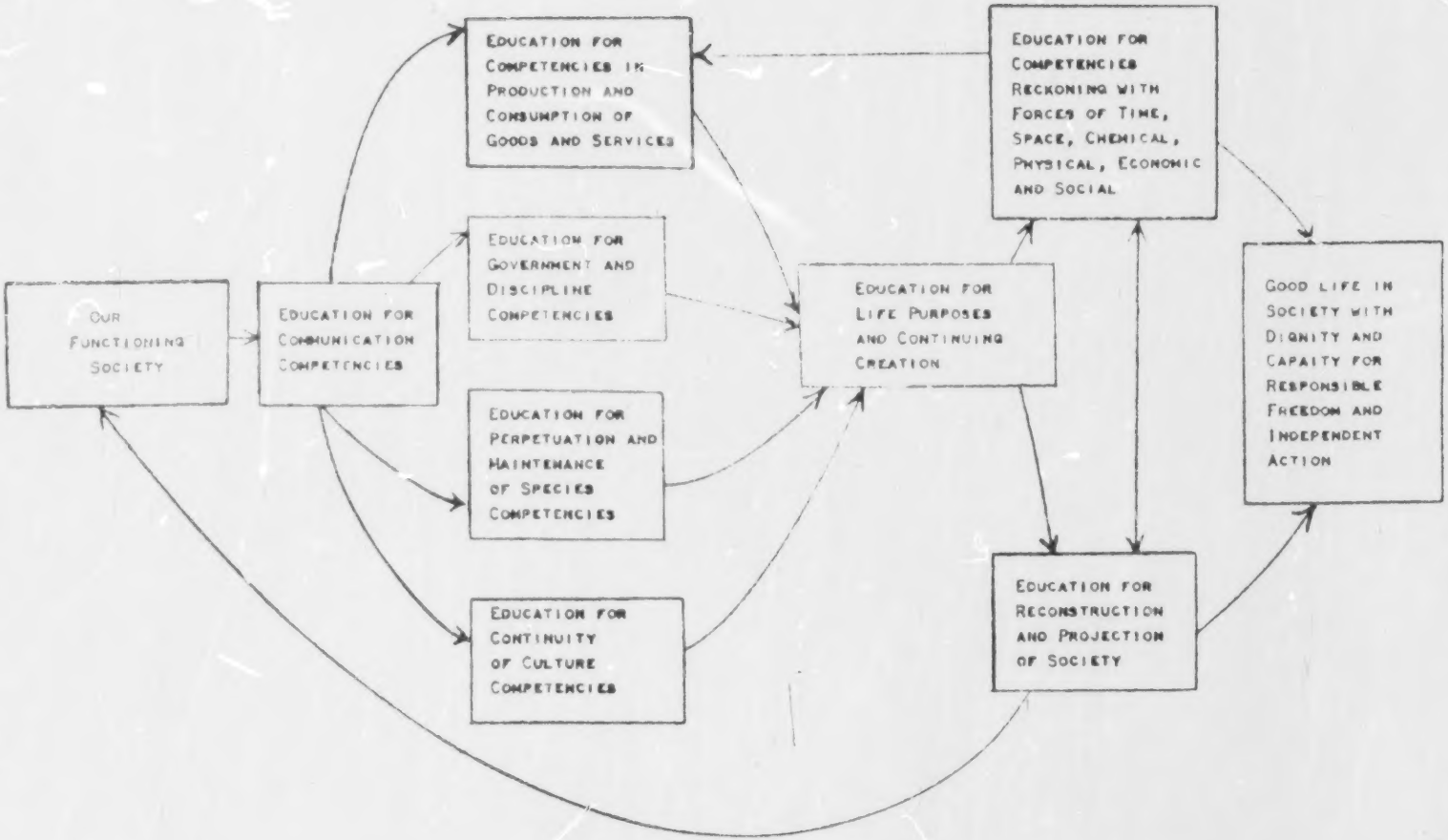

Our Functioning Society
Education for Communication Competencies
Education for Competencies in Production and Consumption of Goods and Services
Education for Government and Discipline Competencies
Education for Perpetuation and Maintenance of Species Competencies
Education for Continuity of Culture Competencies
Education for Life Purposes and Continuing Creation
Education for Competencies Reckoning with Forces of Time, Space, Chemical, Physical, Economic and Social
Education for Reconstruction and Projection of Society
Good Life in Society with Dignity and Capaity for Responsible Freedom and Independent Action

Figure 12

SNAP Map of the Educational System in Our Society (Level I)

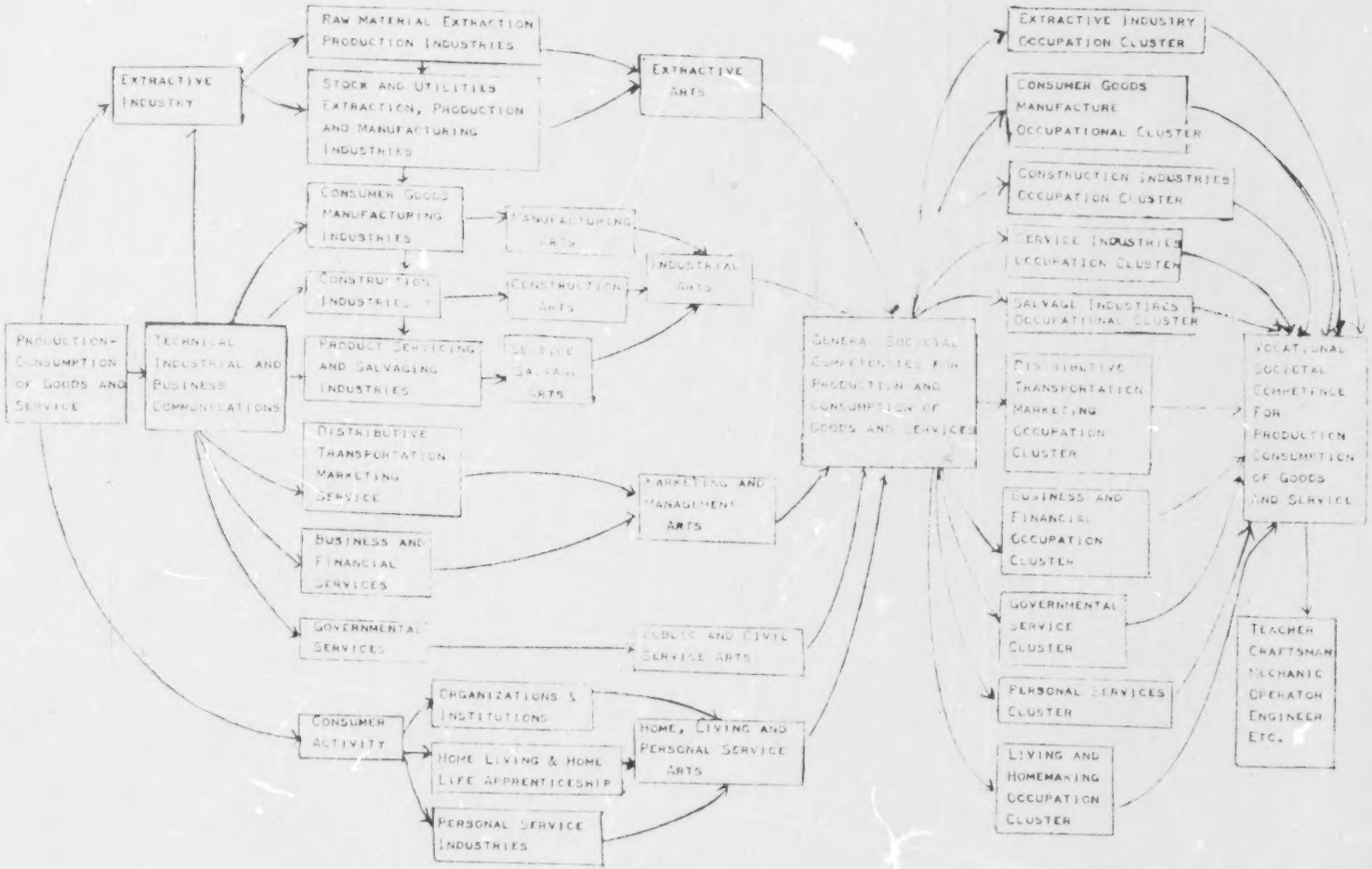

RAW MATERIAL EXTRACTION PRODUCTION INDUSTRIES
EXTRACTIVE INDUSTRY
STOCK AND UTILITIES EXTRACTION, PRODUCTION AND MANUFACTURING INDUSTRIES
EXTRACTIVE ARTS
CONSUMER GOODS MANUFACTURING INDUSTRIES
MANUFACTURING ARTS
CONSTRUCTION INDUSTRIES
CONSTRUCTION ARTS
INDUSTRIAL ARTS
PRODUCTION-CONSUMPTION OF GOODS AND SERVICE
TECHNICAL INDUSTRIAL AND BUSINESS COMMUNICATIONS
PRODUCT SERVICING AND SALVAGING INDUSTRIES
SERVICE SALVAGE ARTS
DISTRIBUTIVE TRANSPORTATION MARKETING SERVICE
MARKETING AND MANAGEMENT ARTS
BUSINESS AND FINANCIAL SERVICES
GOVERNMENTAL SERVICES
PUBLIC AND CIVIL SERVICE ARTS
ORGANIZATIONS & INSTITUTIONS
CONSUMER ACTIVITY
HOME LIVING & HOME LIFE APPRENTICESHIP
HOME, LIVING AND PERSONAL SERVICE ARTS
PERSONAL SERVICE INDUSTRIES
GENERAL SOCIETAL COMPETENCIES FOR PRODUCTION AND CONSUMPTION OF GOODS AND SERVICES
EXTRACTIVE INDUSTRY OCCUPATION CLUSTER
CONSUMER GOODS MANUFACTURE OCCUPATIONAL CLUSTER
CONSTRUCTION INDUSTRIES OCCUPATION CLUSTER
SERVICE INDUSTRIES OCCUPATION CLUSTER
SALVAGE INDUSTRIES OCCUPATIONAL CLUSTER
DISTRIBUTIVE TRANSPORTATION MARKETING OCCUPATION CLUSTER
BUSINESS AND FINANCIAL OCCUPATION CLUSTER
GOVERNMENTAL SERVICE CLUSTER
PERSONAL SERVICES CLUSTER
LIVING AND HOMEMAKING OCCUPATION CLUSTER
VOCATIONAL SOCIETAL COMPETENCE FOR PRODUCTION CONSUMPTION OF GOODS AND SERVICE
TEACHER CRAFTSMAN MECHANIC OPERATOR ENGINEER ETC.

Figure 13

SNAP Map of Production and Consumption of Goods and Services (Level II)

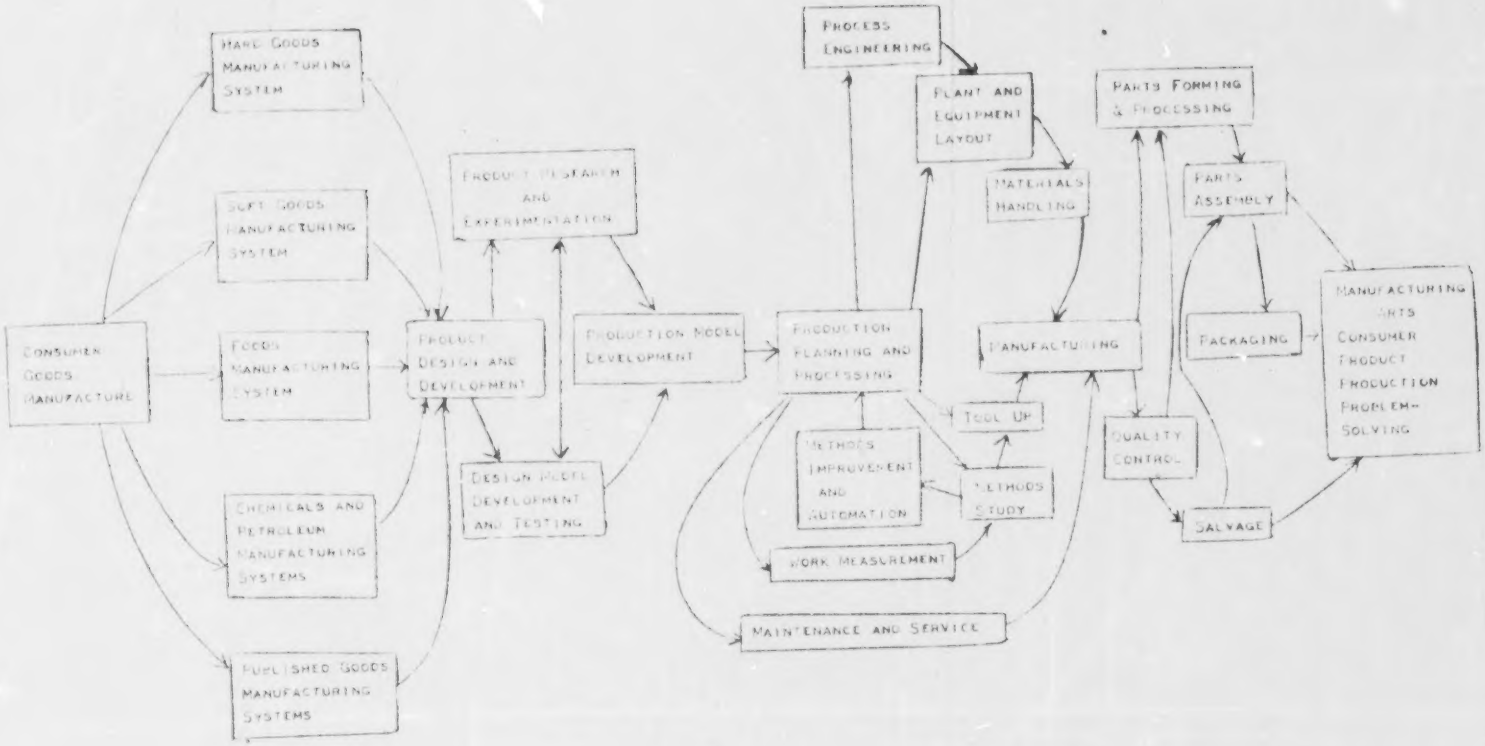


Figure 14

SNAP Map of Manufacturing Arts (Level III)

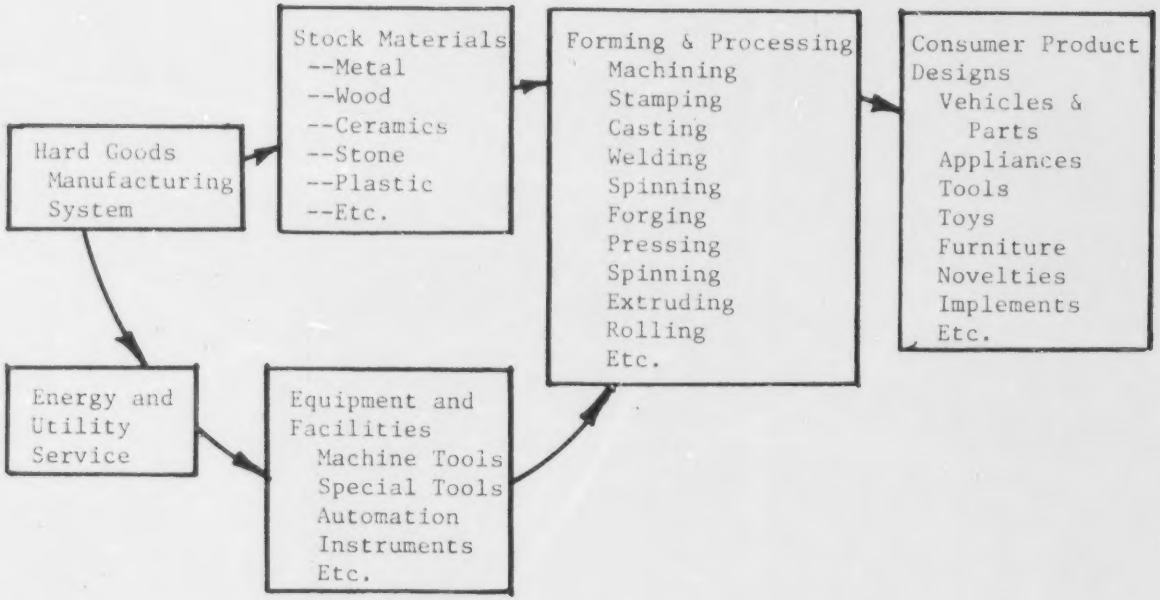


Figure 15

SNAP Map of Hard Good Manufacture (Level IV)

drafting, schedules, work specifications; hydraulics, pneumatics, and automation systems design; maintenance; instrumentation and electronic control; packaging and shipping; quality control; and works measurement, methods improvement, and methods study.

NAME: Oregon Career Education Clusters (5)

DEVELOPER: Oregon State Board of Education

SOURCE: Same

PERSONNEL: State Board and State University Staffs

CLUSTERS: Metals

Construction

Electronics

Clerical

Bookkeeping-Accounting

Secretarial

Marketing

Architecture and Engineering

Business Management

Social Science and Law

Health

Food Service

Forestry

Agriculture

Graphic Arts

Industrial-Mechanical

Child Care

Life Sciences and Medicine

General Studies

GRADE LEVEL: 7 - 12

TARGET POPULATION: The high school program is directed at the drop-outs and those who do not continue beyond high school. Provision is made for those who do wish to continue in occupational programs beyond high school.

OBJECTIVES:

The 1968 guidelines prepared for the structuring and articulation of the program suggest the plan should provide:

1. Meaningful occupational education throughout the junior high and senior high school structure.
2. Opportunities for attaining entry-level occupational competency in the secondary education complex.
3. Occupational education at the high school level that is appropriate to continuation beyond high school.

DESCRIPTION:

The formation of this program was based on a statewide research effort concerning the manpower

situation in Oregon. The express purpose of the research was to obtain data for educational planning.

The planned approach to implementing the program is based on:

1. The adoption of the occupational cluster concept.
2. Occupational exploration in grades 7 - 10.
3. Adequate guidance and counseling.
4. Introductory courses at grades 9 and 10.

The clusters form the core for all the organization, content, scope, and sequence of the high school program. A cluster is defined as a grouping of occupations with identical or similar skill and knowledge requirements.

The Oregon Board of Education and the State Employment Service used manpower data, employment trends, and "key" occupations to identify clusters of occupations. The clusters were examined by a statewide advisory committee to determine what tasks a person performs in a given occupation. The task analysis data were then compiled into "cluster guides" for use in developing programs throughout the state. The guides provide a statement of what should be taught; they do not suggest instructional methodology or sequence, nor ways of adapting from the classroom to the job.

Establishing developmental centers for the clusters was the next step in the plan. The schools used for the location of these centers were selected on the basis of: administrative commitment, available staff and facilities, student population, curriculum potential for maximum development, and geographic location. A five-year plan for operationalizing the cluster concept was set up, and is in operation at the present time. The plan relies, to a large extent, on the commitment and involvement of local teachers, administrators, and citizens.

In addition to utilizing the resources of the local school districts, the plan incorporates an alignment of the clusters with community college programs. Attention is paid to providing not only continuation of training at post-high school levels, but also shared time arrangements prior to high school graduation.

NAME: The Secondary Exploration of Technology Project (SET) (11)

DEVELOPER: School of Technology, Kansas State College, Pittsburg, Kansas

SOURCE: Same

PERSONNEL: Same

CLUSTERS: Power

Communication Technology

Materials/Processes

GRADE LEVEL: 7 - 12

TARGET POPULATION: Junior and senior high school students in all communities in Kansas.

OBJECTIVES:

The plan's brochure states the project is to provide an opportunity for Kansas educators to experiment with and observe an exemplary, broad-based industrial arts curriculum at the junior through senior high school level. Another objective is to experiment with curriculum ideas and to develop curriculum materials that will be applicable to public schools in all communities in the state.

Specifically, the goals are:

1. The project will identify concepts from industry and technology that may be used to develop secondary school curriculum as accepted by a panel of experts.
2. The project will design and operate inservice training for teachers to enhance their ability to teach new concepts of industry and technology.
3. The project will develop learning experiences that will enable students to differentiate

among occupational areas and to contrast the social and technological differences among those areas.

4. The project staff and teachers will write, review, and rewrite an instructional program in industrial arts that will be adopted by other school districts.

DESCRIPTION:

No information was available on the basis for the structuring of the three clusters in the project. The state of Kansas' plan for industrial arts does include these three areas--power, communication technology, and materials/processes.

An accountability model of eight elements was used in the development of the project. The elements were:

1. Community Involvement
2. Technical Assistance
3. Needs Assessment
4. Change Strategies
5. Performance Objectives
6. Staff Development
7. Comprehensive Evaluation
8. Program Auditing

EVALUATIVE FORMAT

Introduction

The process of evaluating a curriculum, instructional plan, or program involves the consideration of numerous factors. These factors, coming as they do from various sources, require a structuring or organization which will place them in the proper perspective and context. In developing the format for this study, attention was given to the foundations upon which the evaluation would be formulated, the distinction between objective description and judgments, the summative-formative aspects of evaluation, and areas of internal and external relationships of the identified cluster plans.

Stake (27:4), speaking on the topic of foundations for curriculum evaluation, indicated that program purposes, content, environment, methods, and changes to be brought about are all concerns of the evaluator in analyzing an educational program. He cautioned, however, that the evaluation process should be founded on a hierarchy of steps, each of which is built upon the other. Starting from basic theory, one proceeds to the development of a rationale for the evaluation. Using the rationale as a foundation, criteria are developed to start the last step,

that of operationalizing procedures that will provide a reflection of the plan in the mirror of the criteria.

In following the above approach, it should be noted that Stake also differentiated between "what is" and the relevance of what the evaluator considers "what ought to be"--the "what ought to be" becoming, in most cases, the subjective whim of the evaluator. This distinction between description and judgment was considered as part of the development of the study's evaluative format.

Gagné (13:33) also indicated the evaluator should be aware of what is presented as pedagogically reasonable, or feasible, and judgments about the "goodness" of a particular plan or plans. In working with either the "what is" or the "what ought to be"-"goodness" areas, the evaluator must specifically relate in the process where it is and upon what value considerations are made. Awareness of this particular point in the evaluative process indicates not only that the distinction noted by Stake should be made, but also that the evaluation process should be directed at one or the other of these two ends--what is or what ought to be.

Maintaining close adherence to Stake's hierarchy and Stake's and Gagné's distinctions between description and judgment leads to the summative-formative aspects of the evaluation. Curricular plans can be viewed as tools performing certain functions in the educational process.

One can set down a description of the tool, describing its characteristics and attributes, and come out with a summative form of evaluation. Placing the tool in the hands of a user and then watching the tool's and the user's performances, one can answer questions that are formative in nature. This study has identified more than one tool. All go by the same name, clusters, but they differ from each other in form and substance. The analysis of these different "tools" in this study is in the form of a summative review. No direct observation of these cluster plans was made.

Theory Base

In the theory which relates to career education, and education in general, a number of areas were considered to be essential to the analysis of the cluster plans. These were philosophical (epistomology and ethics), sociological, psychological, human needs, manpower needs, occupations, and pedagogical points that would contribute to a sound rationale for the proposed analysis.

The foundation for the analysis was based on incorporating the above points into the following concepts concerning career education:

1. Career education is an integral part of general education.

2. Career development is consistent with accepted theories of behavior and instruction as they apply to

cognitive, value development, and psychomotor development.

3. Career development reflects the "real" world of work, including manpower needs and economics.

4. All curriculums should reflect: individual needs and growth; societal needs and growth; and sound pedagogical, psychological, and physiological considerations.

Analysis Rationale

Organizing the above theory into a rationale which would lead to a set of criteria suitable for a descriptive analysis was the next step in the process of the study. Internal and external relationships within and among the plans became evident as the information about the plans was gathered. Two rationales were developed to recognize the distinct importance of each of these two categories.

In the area of internal relationships, those exclusive to any one particular plan, the following points were used:

1. Total inclusiveness of the plan.
2. Exclusiveness of the parts within the plan.
3. Operational adequacy.
4. Context.

The area of external relationships, those concerned with how the plans related to each other, included the following:

1. Plan overlap.

2. Basic source of the clusters included in the plan.

3. Relationship of the plans to each other.

4. Techniques for the development and operation of the plans.

Analysis Criteria

Using the above points, criteria were selected and/or developed to fit the two categories of internal and external relationships. The source for many of the criteria used in the internal relationships category came from Bicknell (7), while the remaining criteria were developed to reflect the rationale.

The breakdown of the criteria for the internal category is as follows:

1. Total inclusiveness of the plan

   a. Magnitude: Did the plan cover all career areas or only some?

   b. Completeness: Are all of the clusters complete in that they treat all aspects of the area? E.g., levels of skill competency; consider aspects of dealing with people, data, and/or things; other areas of the school's program needed to make it function or contribute to the plan's functioning.

2. Exclusiveness

a. Distinctiveness: How are the clusters different from each other? What makes them different? Are they mutually exclusive?

b. Interaction: How do the clusters relate to each other? What is the framework for the interaction?

3. Operational adequacy

a. Feasible: Can the plan be operationalized in the school setting without disruption of the total curriculum? What changes must be made in or what effect does the plan have on the factors of costs, equipment, time, space, and staff?

4. Context

a. Social setting: At what type of social setting is the plan aimed? Does the plan consider a social setting? Is there a provision for community involvement?

b. Readiness: Does the plan consider readiness levels? What types of readiness levels? In what areas: psychomotor, affective, cognitive?

c. Societal needs: What evidence is there to indicate that societal needs and/or models were considered? What were these needs and/or models?

d. Individual needs: What evidence is there that individual needs were considered? What were these needs? In what areas?

The external relationships criteria were as follows:

1. Overlap: What clusters are the same or similar in the various plans?

2. Basic source of clusters: What existing and/or generally accepted career classification systems were used, adopted, or adapted? What theoretical sources were used in the development of the clusters?

3. Plan relationships: Are the plans exclusive of each other? Are there plans that depend on or are part of other plans?

4. Development and operation: What were the types of research and operational procedures used to develop, establish, and test the plans?

Analysis Operationalization

The criteria were applied to the cluster plans as they are presented in this study. When information was available, comments were made with respect to the criteria In the absence of information related to a particular criterion, no comment was made.

ANALYSIS

Reflecting each of the plans in the mirror of the criteria while considering both the internal and external relationship categories presented a number of problems, all with numerous alternative solutions. An attempt was made in the following analysis to remain true to a summative format and to provide information on the internal relationships in a manner which would help in describing the external relationships. Each of the plans is reviewed under the criterion heading to accomplish this purpose.

Internal Relationships

Magnitude

All the plans reviewed, except the Career Development Program, contained specifically named clusters. These specific clusters ranged in number from two to nineteen. The number of clusters in each plan is listed below:

Grayson, Texas, Analysis	15 (USOE)
Arizona Career Education Plan Career Development Program	15 (USOE)
CCEM	12
ISCO	10
Cluster Concept Programs	3
CBIE (State of Kansas)	5
Galaxy	6

IACP	2
Orchestrated Systems	10
Oregon Career Education Clusters	19
SET (State of Kansas)	3
US Office of Education Clusters	15

The USOE plan, the plans using the USOE clusters, the CCEM, ISCO, Orchestrated Systems, and Oregon plans were the only plans covering all career areas. All the others are limited in scope, because of some factor or factors which revolved about their value in industrial education programs. The Career Development Program covers all career areas but does this through learning activities designed to group jobs, occupational areas, or professions on a flexible instructional basis rather than through prior identification.

Completeness

With the exception of the ISCO clusters, all the plans attempted to cover skill areas and levels as well as the topics of dealing with people, data, and things within each cluster. Provision was made to consider the functioning of the total school program in the plans, again with the exception of the ISCO plan. The Career Development Program, USOE, and CCEM plans place an emphasis on activities which are an integral part of the program K - 12, while the other plans are aimed at post-elementary levels.

Distinctiveness

All of the clusters in the plans provide a distinct, separate grouping of areas. The basis for the distinctions varied from plan to plan. The USOE clusters divided along economic and occupational areas of activity. The use of sociological-economic standards provided the main dividing standard for the remainder of the plans. The IACP and CCEM plans did use some distinctions in the philosophical area as a basis for decisions in the sociological-economic area.

Interaction

Levels of competency; professional standards; dealing with people, data, and things; and basic and technical skills were all categories used for the interaction between clusters.

The ISCO used professional-technical standards and skills to describe interaction. Three-dimensional models of job interaction crossing over clusters, as well as within clusters, were used in the CCEM, IACP, and Arizona plans; these models took into consideration occupational titles, worker traits, and areas of economic or industrial activity. The Galaxy plan used a "path" method by which student ability, achievement, aptitude, and motivation were the factors determining the "path"; these paths ran parallel through each cluster. The Cluster Concept Program used a set of human factors which cross clusters--

communication, measurement, skills, math and science, and information. This plan also used some basic skills common to all the clusters as a basis of articulation.

Feasibility

Excepting the CIRF and USOE plans, the remaining plans considered the placement of their programs in the school. In particular, the Oregon, CBIE, IACP, Galaxy, Cluster Concept Program, Career Development Program, and the CCEM plans provided some discussion of where the plan fitted into the school's program. The Cluster Concept Program and IACP materials reviewed the need and effects of cost, time, and space requirements.

In the range of grade levels in which the clusters can be utilized, the Career Development Program, Arizona, and CCEM plans provide a basis for use in all grades K - 12. The IACP, and in part the two plans from Kansas, are directed at the 7 - 8 - 9 levels. The remaining plans, omitting the ISCO clusters, are devoted to implementation in grades 9 - 12.

In each case, the plans attempt to work the clusters into the existing school curriculum without a total change of program. Substitution of the clusters for existing programs in industrial arts, home economics, agriculture, business, and distributive education was apparent in the Arizona, CCEM, Cluster Concept Program, the Kansas programs, Galaxy, IACP, Orchestrated Systems,

and Oregon plans, which used this technique where possible. In the plans with ten or more clusters, an adjustment in school instructional programs is required; to operationalize these plans completely, schedules would have to be changed to include the total plan. These changes would mean restructuring the school program, and could necessitate dropping existing courses to provide time for covering all the clusters.

Social Setting

The social setting for each of the plans was stated in their target populations or in their objectives. No specific mention was made about the type of community or school that would best fit the cluster concepts presented. The target populations and objectives indicated an overwhelming majority of students could benefit from the plans. Consideration given to this topic was in the area of individual needs as they reflect the social setting from which the student comes. Also, in the case of plans by states, consideration was given to the state's social structure and school communities.

The topic of community involvement was presented in the Arizona, Career Development Program, CCEM, and Oregon plans. All of these plans, except Arizona's, looked for active participation of local citizens and/or use of local nonschool resources. Arizona approached this area by providing for an infomed public through a public

information program. Oregon's plan called for the commitment of local citizens to serve in an advisory capacity.

Readiness

The Career Development Program, CCEM, Cluster Concept Program, and Galaxy plans considered the topic of when a student might best benefit from the proposed cluster exploration and study.

The Career Development Program associated readiness with behavioral objectives for the various grade levels covered. CCEM used elements of career education as categories into which activities appropriate for the different grade levels would fit. The Cluster Concept Program used skills necessary to enter the program. The Galaxy plan incorporated aptitude tests as a part of its identification of student readiness to work within a cluster and the path a student would follow.

Societal Needs

The Arizona, Career Development Program, CCEM, Cluster Concept Program, CBIE, IACP, Orchestrated Systems, and Oregon plans all related in their statements concerns for areas such as real world, world of work, change in society, technological impact, and manpower need.

Arizona's plan considered orientation to the world of work, learning to live and making a living as societal needs. The "life" theme appeared in the CCEM as an

objective to structure the program on real life; this plan, too, concerned itself with producing productive-contributing citizens. The impact of technology and technological change appeared as part of societal needs in the Career Development Program, Cluster Concept Program, and CBIE plans; each of these plans mentioned the need to consider these topics in the development and operation of their clusters. The IACP and Orchestrated Systems clusters were based on considering the economic-production system of goods and services for society. Oregon's considerations were initially based on the manpower needs of the state in the present and future.

Individual Needs

Seven plans mentioned in their materials some aspect of individual needs and development. The Arizona plan concerned itself with self-awareness and personal attitudes about work as well as guidance and follow-up operations. The Career Development Program had as an objective the ability to adapt to changes in life and occupations; recognition of the objective is found in the strategies used in implementing the program--flexible requirements and guidance. The CCEM discussed the aim of self-fulfillment as a goal in its program; this was evidenced in the career elements and characteristics of self-identity and self-social fulfillment. The development of insights into information sources leading to

personal mobility across industry, occupation, and geographic area was the goal of the Cluster Concept Program. Complementing the area of personal development in the three-part approach to a total education was part of the Galaxy plan; guidance and counseling were used for this purpose. The IACP, based on its foundation of knowledge categories, had as an objective developing knowledge and skills useful in life situations. The Orchestrated Systems plan proposed to provide a place where potential talents and interests could be tested and measured by the students.

External Relationships

In the above analysis of internal relationships, a number of common threads, dependencies, and similarities among the clustering plans were evidenced. The following information is an attempt to describe these and other factors under the criteria of the analysis model.

Overlap

In just the area of cluster title, there are many identical or similar groupings. There are instances where the titles match, but in most cases there is only a partial overlap. The following charts (Figures 16 and 17), containing the plans and their cluster titles, are an attempt to display graphically these overlaps. Six clusters--two in the USOE, one in the CIRF, two in the Orchestrated Systems,

USOE PLAN (15 clusters)	Cluster Concept Program (3 clusters)	CBIE (5 clusters)	Galaxy Plan (6 clusters)	IACP (2 clusters)
Agri-Business & Natural Resources*				
Business & Office			Business Education*	
Communication & Media		Visual Communication*		
Construction	Construction*	Construction; Materials & Processes*	Materials & Processes*	Construction
Consumer & Homemaking				
Environment**				
Fine Arts & Humanities				
Health				
Manufacturing	Metal Forming & Fabrication*	Manufacturing; Materials & Processes*		Manufacturing
Marine Science**				
Marketing & Distribution				
Personal Services			Personal Services	
Public Service				
Recreation & Hospitality				
Transportation				
	Electro-Mechanical Installation & Repair*	Power & Energy*	Energy & Propulsion*; Electronics*	

*Partial overlap with a cluster in some other plan. **Exclusive to this particular plan.

Figure 16

A Comparison of the USOE Clusters to Plans With Fewer Than 10 Clusters

Agribusiness & Natural Resources*	Natural Resources*	Agriculture*		Agri-science*; Forestry
Business & Office*	Trade & Finance*	Clerical*	Business & Financial*	Acctg.-Comp-Acctg.*; Secretarial Bus. Mgmt.
Communications & Media*	Transportation & Communication			Graphic Arts*
Construction*	Construction*	Production*	Construction*	Construction; Architecture & Engr. Tech.-Mechanical*
Consumer & Homemaking			Living & Homemaking	
Environment**				
Fine Arts & Humanities	Arts & Humanities			
Health*	Health & Welfare*			Health; Life Science & Medicine*
Manufacturing	Manufacturing	Production*	Mfg.-Prod.-Util. Mfg.*	Architecture & Engineering*; Ind.-Mechanical*
Marine Science**				
Marketing & Distribution	Trade & Finance*	Sales*	Dist.-Trans.-Mrkt.*	Marketing*
Personal Services	Personal Services	Service*	Personal Services	Child Care*; Social Science & Law*
Public Service	Government* Education*	Service*	Government* Service*	Child Care*; Social Science & Law*
Recreation & Hospitality	Entertainment & Recreation			Food Service*
Transportation	Transportation & Communication		Dist.-Trans.-Mrkt.*	
	Product Services*		Service*	
		Administration & Finance		Business Management*
		Armed Forces**		
		Professional*		Life Science & Medicine*; Social Science & Law*
			Valves**	
			Extractive Industries	
				Electronics*; General Studies**

*Partial overlap with a cluster in some other plan.

**Exclusive to this particular plan.

A Comparison of the USOE Clusters to Plans With 10 or More Clusters

and one in the Oregon plan--did not match or overlap with at least one other plan's clusters; these clusters are Environment and Marine Science (USOE), Armed Forces (ISCO), Salvage and Extractive Industries (Orchestrated Systems), and General Studies (Oregon).

By grouping the cluster titles, it can be seen that a number of parallels exist among plans. The only indication of a direct relationship among plans is discussed below, under the criterion of Plan Relationships. These parallels may exist because of the proliferation of materials on career clusters and the communication that is carried on among professionals in the field of career education.

Basic Source of Clusters

This category presents the area in which the underlying or basic differences among cluster plans exist. Some of the cluster plans used the same sources of information and even similar theories, but arrived at different groupings or clusters.

Starting with the USOE clusters and the plans using them, one finds the Dictionary of Occupational Titles (DOT) to be a source of information. The Grayson, Texas, analysis of these clusters evidenced this source in its groupings based on job titles. The Arizona plan incorporated these clusters into a model which fits into the scheme the basic instructional areas of language arts,

mathematics, science, and social science as well as an area called service.

The Career Development Program used a definition of clusters as job families--jobs grouped by some identifiable criteria (e.g., worker traits, skills, products, services, etc.). This definition fits a flexible format of instruction, which is aimed at allowing students to recognize that no matter how distinctions between jobs or occupational areas are drawn, other formats of division can apply, too. The goals of individualization and providing knowledge and skills that are transferable among a variety of jobs give some indication of why this method of clustering is used in the plan.

The CCEM plan started on the premise that all available career information systems should be integrated and interfaced. The basic systems used were the USOE clusters, the Human Resources Research Organization model (HumRRO), the Standard Industrial Classification, and the Dictionary of Occupational Titles (DOT). The HumRRO model provided the criteria for the clustering of the information in the other sources; no one source or model met all the criteria. The clusters that were set down for the plan stressed function and content of occupations and status and levels of occupations. An instructional model was developed to fit the basic information model of the clusters. The relationship

between the instructional and informational models is diagramed below. (A more graphic and complete description can be found in the description of the CCEM in the Description section of the study.)

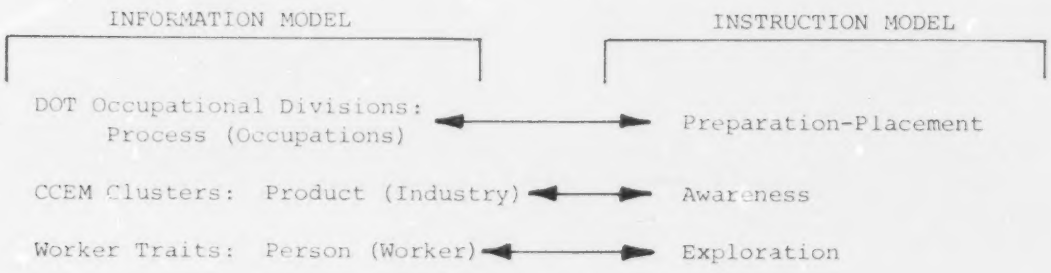


Figure 18
Relationship of the Elements of the CCEM Instructional and Informational Models

The point that this plan stresses is the interrelatedness of the different dimensions and the interaction between dimensions in both models.

The ISCO uses a classification of occupational level, which it imposes upon a classification of economic activities. This resulting grid pattern provides for the placement of any occupation or occupational level in any cell of economic activity. The plan does not provide information concerning the rationale used in classifying the occupations or the economic activity.

The Cluster Concept Program bases its clusters upon the areas traditionally taught under the title Trade and Industrial Education (T&I). The objective of clustering into specific groups within the T&I field was to

provide for meeting the common needs of students who might study in this area and to give the student flexibility to change industries and/or occupations. The clustering primarily relies on combining the skills and knowledge common to the specific cluster title: the commonality of the skills and knowledge across clusters provides the basis for the initial instruction.

The clustering in the CBIE is based on extending the IACP format (see below) into the secondary school program. Using the two IACP clusters as a base, the three clusters in this plan implement the introduction-analysis-synthesis instructional strategy in their respective knowledge areas.

The six clusters used in the Galaxy plan are based on dividing identified job skills into manageable groups similar in knowledge, manipulative skills, and attitudes. This clustering plan makes up one part (Career Preparation) of a total educational model, of which the other areas are Basic Education and Personal Development.

A philosophical classification of knowledge forms the basis for the IACP plan. Using a four-domain model of knowledge--formal, prescriptive, descriptive, praxiological--this plan concentrates on the praxiological domain. This concept is set into a model of societal institutions and focuses on the economic institution, breaking down the economic institution into the following component parts:

material production

communication

domestic

education

entertainment and recreation

finance, insurance, and real estate

health

legal

marketing

transportation

The plan singles out material production as the area for identifying the practices and knowledge of practice in the category of industry, which includes construction and manufacturing. These two clusters are then imposed on a three-dimensional model with the dimensions of material goods, production practices, and management practices. An instructional model emphasizing these dimensions and their subdivisions is utilized in teaching about knowledge and practices. The stress of the instruction is placed on introducing, analyzing, and synethesizing the information and skills.

A systems model forms the foundation for the Orchestrated Systems plan. Systems analysis is applied to society and the instruction about the production and consumption of goods and services in society. The approach, called Systems Network Analysis Process (SNAP), breaks society down into a series of subsystems; the clusters are defined and described in terms of those subsystems. Instructional content is delineated by applying SNAP to each cluster. Instructional strategies are based on a central core of activities which cross over

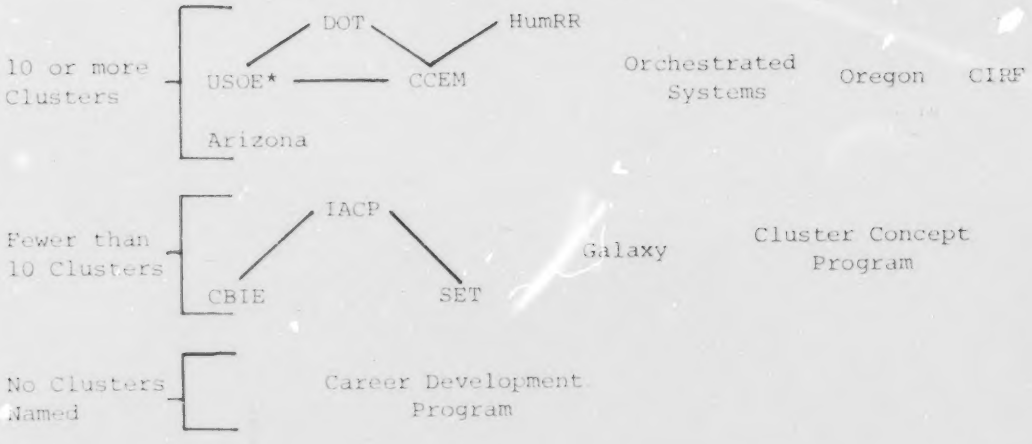
clusters; some of these activities are research and development, communication, and quality control.

Oregon's plan is based on grouping occupations along the lines of identical or similar skill and knowledge requirements into clusters. The sources for the identification process were manpower data, employment trends, and "key" occupations. An advisory committee examined the clusters to determine the tasks involved, and organized these into "cluster guides." The cluster guides provided the basis for the development of instructional programs.

The SET plan and the CBIE plan used the IACP clusters as a base. The three clusters in the plan are concerned with a broad-based industrial arts curriculum. These clusters are again the reflection of the Kansas state plan for industrial arts programs.

Plan Relationships

As was noted in the Overlap category, similarities exist among clusters. Dependency of one plan on another was intentional on the part of the developers in some of these instances of similarity. The direct, planned relations are shown in the diagram below. The dependencies in the USOE and CCEM were based on common information sources. In the CBIE plan, the dependency relied on common philosophical and instructional grounds with the IACP plan; in the SET plan, the link was with the IACP philosophical knowledge base.



*Including the Grayson, Texas, analysis.

Figure 19

Intended Relationships Between Clustering Systems

Development and Operation

All of the cluster plans have been operationalized to some extent. The ISCO plan, because of its noneducational orientation, provided no information in this category. In all other cases, the plans are in some stage of development, testing, and/or operation; this activity ranges from a completed program in the IACP to some schools using variations of the initial concept in the Orchestrated Systems plan.

The development-testing-operation process of the plans' implementation involved the use of techniques in behavioral and curriculum research. A description of the individual approaches used for the various plans is beyond the scope of this study.

In general, the techniques used in the plans involved the setting of goals, assessing progress toward goals through proper forms of research, and then re-evaluating the goals in relation to the research findings. At this writing, only one plan, the IACP, has gone through the entire cycle of research, development, dissemination, adoption, and operation.

At this point, note should be made of the topics or areas not considered in this study. The basic objective was to gather cluster concept information and to provide some analytic comments concerning the nature of the cluster concept in career education. In the process of the study, organizational and instructional topics received primary attention. Direct consideration was not given to two additional areas that make up a complete curricular component--guidance and administration.

Staying within workable boundaries provided one of the arguments in the rationale for omitting the topics or areas noted above. A conscious choice was made to set aside the topics of guidance and administration for the following reasons. First, it was assumed that information about organizational and structural patterns would be necessary for the examination of any other area related to the cluster concept. This study would be the requisite source of that needed information. Second, it was assumed that the complexity of factors within guidance and

administration would confound and confuse an examination and description of the various cluster plans with respect to the organizational and instructional areas.

An example of the complexity of the factors involved can be seen in the area of guidance. Some of these factors include the comparison of new unknown areas, such as the cluster concept, with the body of knowledge and practices that exists in an area like guidance, the multiple roles played by guidance personnel in the school setting, and the theoretical frameworks in which career guidance is conceived.

The theoretical career development framework falls into complexities that are beyond the boundaries of this study. Trait-factor, sociological, self-concept, and personality theories, with their many subdivisions, all provide avenues for exploration with respect to career clusters and other forms of career education. The complexity of this point is underscored by the fact that certain guidance theories approach their own forms of categorization or clusters in career areas. This clustering is evidenced in the work of two career guidance theorists, A. Roe and J. L. Holland. Their research focuses on the classification or typing of occupations, occupational environments, and personality types into career groups or clusters for the purpose of helping individuals make a sound decision in selecting a career.

Research into the above points as well as into the area of administration must be initiated to provide a comprehensive statement about the operation of career clusters in the schools. It is hoped this research and exploration can be carried out by others.

CONCLUSIONS

The review of the preceding cluster concept programs presents a number of conclusions or generalizations that can be made about the concept. Of basic importance is the concept of what is a cluster. Stated in general, clusters can be defined in a number of ways, but in all cases they take into consideration areas of knowledge, skills, and attitudes which can be grouped in such a way that there is a commonality of purpose or intent in the grouping. This purpose or intent is usually based on a sociological and/or economic division of human activities as they apply to earning a personal livelihood and contributing to societal growth. (Further statements about the cluster concept are given under the analysis heading below.)

Internal

1. Cluster plans are not necessarily comprehensive --covering all areas of human activity.

2. Instructional models or schemes are not part of all cluster plans, but the majority of the plans do consider the placement and operation of the plans in the school's curriculum.

3. In most cases, the clusters included in the specific plans consider aspects of dealing with various forms of knowledge, skills, and attitudes necessary for interacting with people, data, and things.

4. Clusters, as they adhere to their defined areas, differ from each other but there are certain elements or activities that transcend the divisions and provide a common area for interaction among clusters in any one specific plan. These elements and activities are usually categorized along basic educational areas or skills, e.g., language arts, communication, social science, math, science, measurement, etc.

5. Cluster plans are available to fit K - 12, 7 - 8 - 9, and 9 - 12 grade level formats but the majority of the plans focus on secondary levels (grade 7 and up).

6. Some clusters are designed as elements to fit into curriculums through substitution for areas already being taught, while in the case of new subject matter they do become additions to the curriculum.

7. The social-school-community setting required for the implementation of most broad cluster plans is broad enough to allow their use in all areas of the country and in both rural and urban settings.

8. Community involvement is considered a part of most cluster plans with instructional models or schemes. This involvement is an active element only in the operation of a few plans.

9. In the plans that consider instructional schemes or strategies, only the Career Development Program, CCEM, Cluster Concept Program, IACP, and Galaxy plans incorporate some use of student readiness into their operational models.

10. A majority of the plans consider societal needs as part of their developmental rationales. These needs are expressed in terms of technological impact, resultant change in society through technology, participatory-contributory citizenry, and manpower demands.

11. Individual student needs are considered in the rationales of a majority of plans. These needs are recognized in the cognitive, affective, and psychomotor domains with emphasis being placed on the affective domain and how it affects the development of knowledge and skill leading to personal satisfaction. Most often a guidance function or strategy is used to operationalize this area.

External

1. Overlap among cluster plans exists. Of the plans reviewed, there were 70 instances where cluster title completely or partially matched the title of a cluster in one or more other plans. Only six clusters, of the 82 specifically named, did not match any other cluster.

2. There were only four direct relationships among plans. In three of those relationships, the common base was the use of adoption of clusters from another plan. The fourth relationship was based on common information sources.

3. The sources for the rationales upon which the cluster divisions were made varied from plan to plan. These sources were either philosophical, sociological, psychological, economic, occupational, or a combination of two or more of these areas.

4. Clusters for industrial education are relevant only when viewed in the context of a total cluster plan. Therefore, clusters for industrial education instruction should be identified from within a complete comprehensive cluster scheme, such as the USOE or CCEM.

5. The CCEM offers the most viable alternatives for national use, while Oregon's plan best depicts a plan which is unique to the specific needs of a particular state.

RECOMMENDATIONS

With the objective of providing a sound foundation for the use, adaptation, or adoption of a clustering plan or system, it is recommended that consideration be given to the recommendations below. These factors cover areas of educational, philosophical, psychological, sociological, and economic import.

1. The CCEM cluster system appears to approach the fulfillment of the above considerations and those of the prior evaluative analysis criteria more closely than the others. Since this plan seems to be closest to the ideal, it may best serve the purpose of a basic model for a suitable statewide plan that utilizes the cluster concept in career education--a model through which the needs of the state can be met even better after appropriate refinement. Further, in its favor, much has already been accomplished by CCEM curriculum development projects across the nation, including, among other things, field-tested instructional units and materials. Michigan career education should adopt and refine the CCEM cluster scheme.

2. Basic research into the nature of career development theories in the area of guidance and the relationship of these theories to the comprehensive cluster

plan should be undertaken as part of the refinement process mentioned above.

3. Included in the aforementioned refinement process should also be an examination of how administrative structures and practices can best be used to implement and operationalize the cluster concept in the school.

4. Since the CCEM cluster plan appears to be the most appropriate, it follows that those institutions and agencies responsible for school personnel development should adapt and/or create preservice and inservice programs geared to this plan. This should be drawn to the attention of teacher education coordinating bodies and agencies in Michigan, since further development of cluster-based personnel development curricula will require interinstitutional coordination to maximize the results.

5. It is apparent that existing departmental structures at universities do not coincide neatly with the CCEM clusters. Therefore, alternative organizational means, such as interdisciplinary task forces, will need consideration in order to implement the needed education personnel development schemes better.

6. Meanwhile, industrial education personnel could proceed with the development of programs for the construction, manufacturing, product services, and transportation/communications clusters, since content of these clusters

approximates that already existing in industrial education programs. Similarly, agriculture and natural science could deal with the natural resources cluster, business with the trade and finance cluster, and home economics and health with the personal services cluster. Other clusters could be covered by other subject-matter specialists. However, those clusters, as well as most of the others noted above, ideally need interdisciplinary attention.

7. Clustering should be considered as having additional utility in the preparation phase of career education when vocational curriculum planners are attempting to avoid excessive specialization.

8. Efforts should be made to identify and catalog existing curricular plans, teaching units, and instructional materials according to CCEM clusters so that they might be more readily accessible.

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